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Electrical World

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June 9, 1923

THE phenomenal rise and development of the electric light and power industry in the two score years of its existence is a familiar but none the less an astonishing fact. During the past twenty years every five-year period has recorded a doubling of output, which is now measured in tens of billions of kilowatt-hours, and the price of the service, in contrast with that rendered by almost every other utility, shows a decrease despite the increased costs of every element entering into it. Nor is there any indication that within the lifetime of its foremost leaders the pace will slacken. The manifold applications of electricity in the home, on the farm, in industry and in civic life have added to the safety, comfort and joy of living to a degree that it is difficult to grasp. It is enough to know that we possess it and that it can serve almost every end to which man cares to apply it.

ENGINEERING skill and executive ability have made this possible, and the organization to which more than all others the credit belongs is the National Electric Light Association, to whose convention just held in New York City a large part of this issue of the *Electrical World* is devoted. Its hundreds of committees are at work incessantly seeking how to improve electric service without increasing its cost. How diverse the interests represented in the association are, and how intricate the ramifications of the business itself, is exemplified in a remarkable degree in its annual meetings. The thoroughness and expertness with which its affairs are conducted compel admiration. The electric light and power industry itself is a monument to private initiative and enterprise, and the work of the National Electric Light Association has played a great part in giving to the United States a system of electric generation, transmission and distribution exceeding in magnitude and scope that of any other nation.

Report of the Forty-Sixth Convention of the National Electric Light Association

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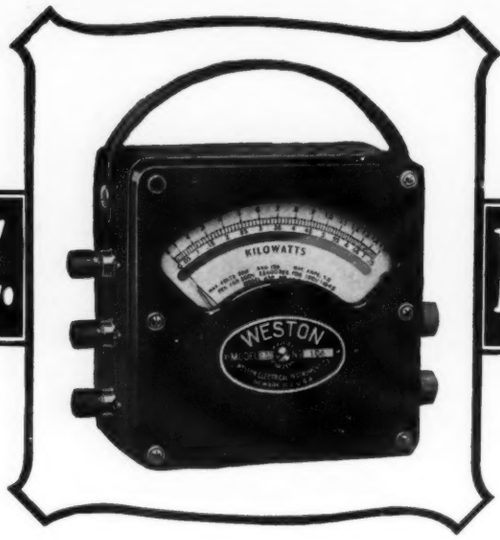

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W. H. ONKEN, JR. Editor

HAROLD V. BOZELL Editor

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A Challenge to Initiative

TO GATHER at conventions, to learn by direct contact of one another's accomplishments, to realize the progress going on about one, is always an inspiration. Each convention leaves some evidence of its being. But the N. E. L. A. convention just closed proved more than an inspiration—the records of progress, the opportunities for the future, the very insistency of the demand for action to meet various needs, provide a challenge to the initiative of every man in the electrical industry.

Who can sit idly by when nation-wide superpower networks are discussed on such a sound basis of knowledge, with such background of experience, such assurance of ultimate accomplishment, as was voiced this week? The opportunities thus unfolded appeal alike to executive, to engineer, to commercial man, each in his own sphere, to help make possible the development which will mean so much.

Who can listen to John A. Britton and others who talk his language without becoming imbued with a desire to make immediately effective the ownership of all utilities by the public through stock ownership—according to the basic ideals on which this nation has developed?

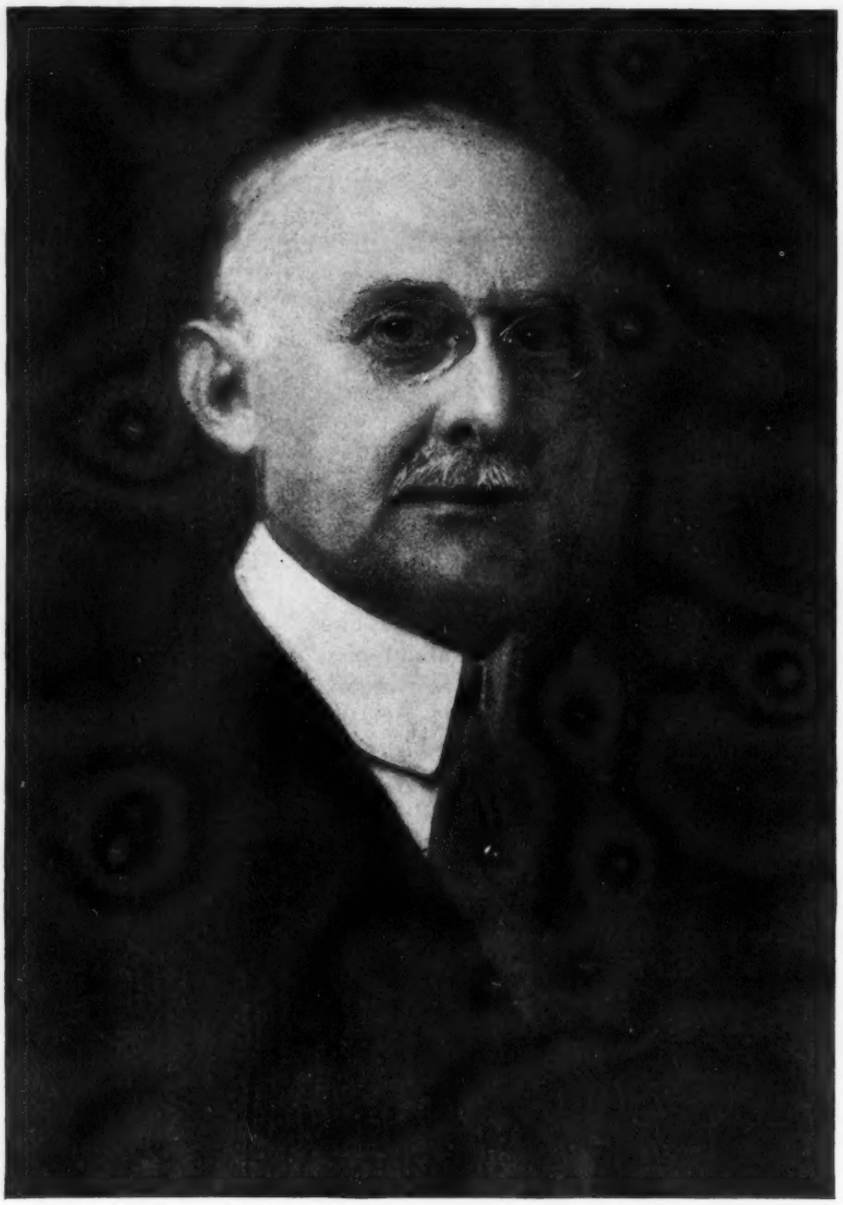
Can there be any one who would listen to a symposium on public relations such as was held on Thursday without being ashamed of any and every act of his own which contained the possibility of needlessly offending a customer, who would not feel bound to reform for the benefit of himself, his industry and his customers?

The demands made on accountants for more efficient methods and personnel—the direct appeal made by R. F. Schuchardt that engineers rise to their opportunities, while he pictured to the executives the extent to which they depend on the engineer and could depend on him still more in the future—the vision of opportunities opened up to the commercial men, with the accompanying analysis of markets hungry for energy and equipment, the demand for electric service from every quarter, as discussed by these men—all this is an exhortation to the industry and to the men who make it up that must and will be met.

The electrical industry is not one to slacken its pace for any reason. Rather at every opportunity it leaps forward with increased momentum. The convention just past has not only offered opportunity—it has issued a challenge to perform tasks, to conquer obstacles, and yet to render an unequaled service, which may well tax the initiative of every one who fills a place, however small, in the industry's ranks.

Walter Howard Johnson

A Philadelphian who has had a large part in building up the electrical industry in his native city and has made his influence felt beyond its boundaries.



THE new president of the National Electric Light Association, Walter H. Johnson, has for more than thirty-five years been identified with the corporations engaged in developing the electric public utilities of Philadelphia. For the greater part of that time he has occupied an official position, and he is now the senior vice-president of the Philadelphia Electric Company, which furnishes light and power service in Philadelphia and its widely extended suburban communities.

Mr. Johnson was born on Aug. 27, 1863, at Philadelphia. After a public school education and a varied early experience he entered the employ of the Edison Electric Light Company of Philadelphia on its formation in 1887 and soon afterward was elected secretary. During this formative period of the central-station industry, in the capacity of general manager and secretary of the Philadelphia Edison company, he was associated with the pioneers of electric light and power who in every city were laying the foundations of the great industry that has so quickly grown to the mammoth proportions of today.

After several changes in company control the Philadelphia Electric Company was incorporated on Oct. 6, 1899. Of this organization Mr. Johnson has been assistant to the president, a director and vice-president for many years, and a little more than a year ago he was elected senior vice-president. His connection with the industry has not, however, been confined to the Philadelphia companies. He has been for ten years on the executive committee of the National Electric Light Association and for the last year has been the ranking vice-president of that body. He was president of the Electric Vehicle Association and closely associated with the founders of the Society for Electrical Development, of which he was chairman of the executive committee for some years. He was also president for two terms of the Association of Edison Illuminating Companies and has served for many years on numerous important committees of both the Edison association and the N. E. L. A.

He is a member of the Franklin Institute of Pennsylvania, a life member of the Navy League of the United States and a member of the Pennsylvania Society of the Sons of the Revolution, as well as being prominent in Masonic circles in Philadelphia. His Philadelphia clubs include the Union League, Racquet, Philadelphia Country and the Merion Cricket, and he is also a member of the Engineers' Club of New York.

Editorial Comment

Electrical World, June 9, 1923

Volume 81 Number 23

Convention of National Electric Light Association

IN POINT of attendance the forty-sixth convention of the National Electric Light Association, which closed its sessions yesterday in New York City, was by far the largest ever held by the association; in interest displayed, in scope of program and in its general features it was also signally impressive. Bigness was its essential characteristic. There was no escape from a consciousness that the electric public utilities of the country were doing great things and had even greater things in contemplation. Seldom has so vivid an impression of their opportunities and their obligations to serve the nation been given to the executive heads of the industry, and seldom has the question of public relations been so completely and so thoroughly discussed. Banker, farmer, educator, manufacturer, publicist, regulator and government official vied with men of the industry in their appreciation of the importance of this question, and evidence was not lacking that customer ownership of securities offers a partial solution. If there ever was a convention which served to impress executives, engineers, commercial men and accountants alike with the outstanding problems of the industry and which was effective in ridding them of provincialism, it was the one just closed. For this President Frank W. Smith, the staff at headquarters and the numerous committees deserve credit. The operating companies in the metropolitan district of New York are also to be commended for the excellence of the arrangements and the hospitality showered on the delegates and guests. In every way the convention was an accomplishment of which the industry may well be proud.

Public Relations Work Assuming More Definiteness of Character

THE phrase "public relations" is an old one in public utility circles, and its indefiniteness has been one of the difficulties in reaching agreements on what to do and how to do it. As Chairman Sands aptly put it this week, when the Public Relations Section was started it sailed out on uncharted seas for a destination unknown, with but a vague notion of the haven to be sought. But any one who attended the three sessions at the convention, or who takes the trouble to study the record of these sessions, must certainly agree that the very accomplishment of such a series of meetings proves that bearings have been taken and a more definite course is being steered. Not that good public relations has any easy or specific definition—although "public sympathy and active appreciation in the degree to which it is merited" carries a good deal of significance. But the fact that discussions tend to leave generalities and get down to cases, the fact that more and more is the individual contact with and education of the consumer recognized as essential, and the fact that executives are taking active and not passive interest, all show that substantial and definite progress is being made.

This subject is admittedly—even emphatically—one of the most important for the future as well as the present of the industry. The reports of the meetings, the symposium of commissioners and executives, given in this issue are well worth study and should serve as inspiration to every utility man—and every other electrical man—in his daily life.

Customer Ownership a Vital Necessity

ELECTRICAL men and women have been told the benefits of customer ownership of utility securities many times in the past half dozen years, but in the lens of the N. E. L. A. convention this week the growth and achievements of this wonderful movement for better public relations and more convenient financing were focused with new power by leaders of thought and action for the clearer visualization of the industry. At a notable gathering Messrs. Britton, Hall, Egan and Forbes held their audience almost spellbound as, with clarity of vision, they told what the achievements and opportunities of this great development mean to utilities. Barely nine years ago the first offering of securities to employees and then to the customer public was made by Mr. Britton's own company, and like a rolling snowball the development has spread from coast to coast and is now in amazing popularity. To its celebrated victory over state ownership last fall in California could be added numerous other triumphs if space permitted, but enough has been learned about this policy to establish it as absolutely essential to the permanent success of private management under public regulation.

No apologies are offered the readers of the ELECTRICAL WORLD for the pages devoted in this issue to the message of these able leaders as presented at the New York convention. In their addresses a new observation of latitude and longitude was taken for the industry's course toward the goal of full customer and employee participation in utility financing. These men made it plain that full speed ahead must be the order, coupled with a keen look-out for the rocks of indifference to human relations and the shoals of ill-advised security issues. The crew must be made partners in privilege and responsibility to insure a steady voyage, and the warm sun of friendly intercourse between navigating officers, personnel and passengers must be welcomed to drive away the fogs of misunderstanding and false propaganda. There must be no mistakes as to soundings of financial depths. Given these things, the good ship will speed over quiet seas, leaving old misunderstandings and errors to churn and die in the waters of the past, while, obeying the chart of the new policy, a straight course is steered to the port of entirely success-

ful public relations. Without this movement, private management might easily be swamped in the stormy seas of political control, leaving the industry to drift on the waters of lost initiative to an uncertain and perhaps fatal end.

Company Budget for Control Needs Intelligent Use

THE annual budget has been a bugbear in many organizations because it has been made a method for beating down expenditures by tying department heads to estimates made months in advance on meager data and then treating failure to live up to the estimates as reprehensible. It is unfortunate if, as some accountants claim, so useful a method has become a stumbling block to its own greatest effectiveness. The whole—and wholesome—purpose of budget formation is to build up an intelligent control of business expenditures by placing before responsible officials the best guess that can be made of the things to be provided for over the budget period. At no time is it possible to estimate months in advance the actual expenditures that must be made. But the best estimate based on available data does show department heads the direction in which they are traveling, and as new conditions arise the budget should be unhesitatingly revised without discredit to any one unless it has been shown that real carelessness necessitated the revision. This is in line with the conclusion reached in the discussion of the budget system before the Accounting Section of the N. E. L. A. The budget system should not be used as a club rather than as the useful tool that it is.

Higher Distribution Voltage Should Be Studied

THE plea made by C. W. Stone before the technical session of the N. E. L. A. on Tuesday for serious consideration of the use of the 250/500-volt, three-wire system for distribution will probably arouse a great deal of dissent. Two conditions becoming evident in the distribution field may help to throw light on the discussion. The first is the tremendous investment in copper going into low-voltage systems—a tendency just now most evident in the direct-current systems because of the use of direct current in the districts with high load concentration. The other is the difficulty of obtaining the necessary substation sites for low-voltage distribution systems, this tendency also being more evident in the direct-current field.

That a tremendous saving in copper costs can be made by raising distribution voltages, as stated by Mr. Stone, is self-evident. The first tendency of many engineers perhaps will be to jump to the conclusion that the expense and difficulty of adjusting the system to cover present low-voltage appliance and lighting service will overbalance the saving. Such an opinion should not be allowed to exist without first investigating what changes will be necessary. The natural tendency to shirk a task which apparently involves many problems should not, however, rule.

The fact is that an alternative tendency with the same purpose in view is evident in the gradual curtailment of direct-current distribution that is being accomplished by cutting off the outlying fringes of direct-current districts and the carrying of higher-voltage alternating-current circuits into the heart of such districts for large power service. The elimination of copper in the low-voltage circuits is accomplished to some extent by the use of numerous step-down points from high-voltage alternating primary circuits. It is possible that there is a limit to this practice which will appear as the concentration of load increases. It will then be necessary to consider an increase of service voltages.

Mr. Stone has made a suggestion that deserves careful study. The difficulties are far from insurmountable when economic considerations justify a change.

New Life for the Commercial Section

CHAIRMAN WILCOX of the Commercial Section is to be congratulated on beginning his administration on the wave of a renaissance. For some years it has been recognized that the Commercial Section was not meeting the fullness of its opportunity. The older men after serving as chairmen have been drifting away from the section—outgrowing it because the section itself has not advanced with its best men. Hence many problems of an executive nature that are essentially commercial have followed these older men into the other sections, and such subjects as customer ownership and public relations are no longer on the commercial program, though vital in local commercial work. E. W. Lloyd, as chairman of the nominating committee, frankly and plainly discussed this condition and, while paying well-deserved tribute to the achievements of Chairman Hogue's administration, appealed for the support of the "old guard." Mr. Hogue got behind the effort in a pcactical way by recommending that six of the ex-chairmen be made members-at-large of the Commercial Section executive committee and put into harness.

Here is a most fitting culmination of a successful year of work, during which Mr. Hogue has brought new interest to this branch of the association. The initiation of the three national co-operative programs which have been organized to promote store lighting, industrial lighting and the electric truck stand as credits to the 1923 Commercial Section. All this should prove a stimulus to all central-station sales managers, and if the Commercial Section now receives the support of the ex-chairman great progress can be made.

Here is a matter of real moment. This frank recognition that the Commercial Section today does not stand on the high plane of the Technical and Public Relations Sections is the first step in the upbuilding of this branch of the National Electric Light Association to the position of major prominence that it must fill. With this support Chairman Wilcox has a great opportunity before him.

Inductive Co-ordination Committees Have Overcome Suspicion

THE inductive-co-ordination committee session at Atlantic City last year was called by some a "love feast." K. L. Wilkinson, engineer of foreign wire relations of the American Telephone & Telegraph Company, in reviewing the year's progress before the same committee at this year's convention, protested against the designation and styled the demonstration then an

exercise of good business sense. The meeting this year included a free discussion of two specific though hypothetical problems in which telephone and power men participated with evident enjoyment and which could have been conducted only because mutual confidence has been established.

The inductive-co-ordination problem has not been solved. In the sense that it can be laid away and forgotten the solution probably never will be found, as Prof. C. F. Scott indicated in the discussion. The thing that the session this year demonstrated was that suspicion of each other's motives on the part of power men and telephone men has disappeared and in the future the work can proceed with only the normal differences of opinion that any human relationships involve. This result demonstrates as well as any association activity the value of honest co-operation.

Agreement Reached on Circuit-Breaker Duty

NOW that all conflicting opinions have been brought into harmony by the general agreement regarding the definition of circuit-breaker duty, manufacturers will be in a better position to furnish circuit breakers for a specified rating since they have a definite basis on which to work. It will be up to operating companies to say whether they want circuit breakers which will have a certain rating for one, two, three shots or more; and, as the electrical apparatus committee of the N. E. L. A. pointed out in its report this week, companies which buy circuit breakers on a two-shot basis will have to depend on the use of factors to determine what the rupturing capacity will be on other duty bases. Moreover, present published ratings will have to be reduced approximately 20 per cent to comply with the new basis of rating.

A Wider Outlook in Accounting

DESPITE the handicap of a reputation for dryness which has been much exaggerated, public utility accounting has increased in interest not a little within the past few years. Last year the sessions of the National Accounting Section of the N. E. L. A. illustrated by a very diversified program the newer aspects of this analytical specialty, and the New York convention of 1923 continued the good work. The advance of commission regulation, increased demands for more accurate allocation of expenditures in operation and construction work, the need of more complete information as to the make-up of capital accounts, and the stimulus of educational opportunities, have all influenced the development of accounting toward a well-established professional plane.

This wider outlook is a good thing for the industry, for it means a closer relationship in future between its accountants and other departmental workers and executives; it means another source of executive personnel—when duly qualified—and more accurate administration of properties representing large financial values. Commission cases are going to be more thoroughly prepared because of this breadth of interest which is coming to be associated more and more with accountants. One word of caution, however, should be uttered. Accountants should develop a broader and deeper sense of proportion in their work and discussions, lest too much occupation with hair-splitting points of procedure outdo the legal profession at its meticulous worst. Accuracy in computations and loyalty to the best practice must be observed without question, but veneration for routine should not be built into a barrier separating the accountant from his engineering, commercial and executive brethren. The growing diversification of interest in accounting pursuits is a gratifying sign of the times in electric utility circles.

Preserve Records— They Are Valuable

AN IMPORTANT note of warning was sounded during the N. E. L. A. convention by the Accounting Section committee which rendered a detailed report on the preservation of company records from fire hazard. The almost unbelievable truth was brought out that so far as known there is not a single central-station company in the country which has taken the very ordinary precaution of insuring its records. When it is realized that one little volume of a hundred pages or so may contain summarized thought and labor representing many thousands of dollars, when a few minutes' study of the question brings out the fact that it would be virtually impossible to restore such records if destroyed and that, even if they were possible of restoration, it would be only at the cost of much money and months of labor, then the situation becomes apparent.

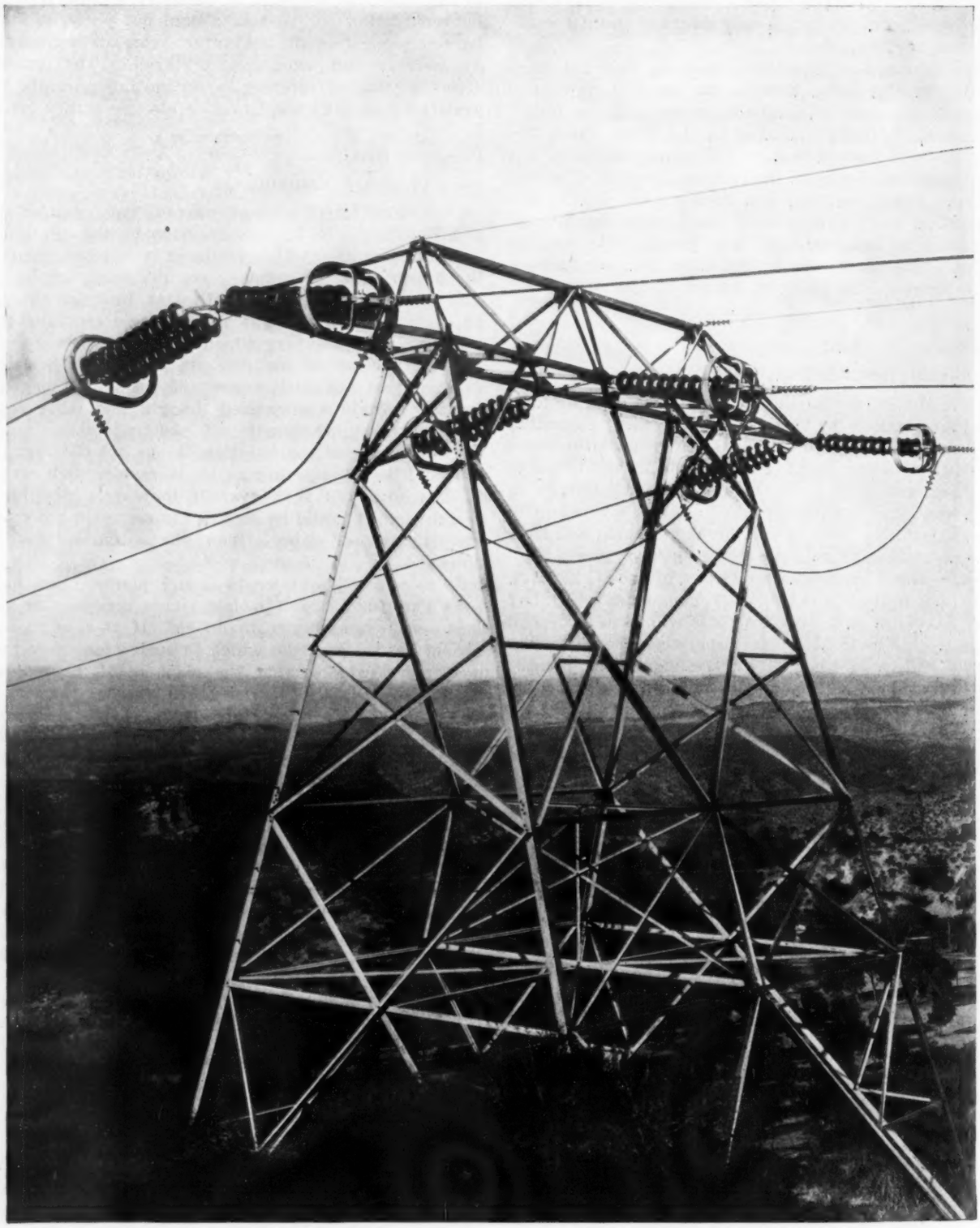
It is common practice to insure plants, office buildings and furniture. In fact, it is accepted as poor business judgment not to do so. If this is so, why should not the records, which in some cases may prove even more valuable that the plant itself, be insured? The natural questions arise as to whether the risk involved makes the rates laid down by insurance companies for such a class of underwriting prohibitive and whether the insurance companies have no classification for such a type of insurance and so will not insure. The Accounting Section committee studying this subject during the past year found the latter to be the case and that even Lloyds had not underwritten any such insurance. The national society has another task added to its schedule of activities in bringing this condition to the notice of the insurance companies. The industry has grown so fast, its history has been so short, that this important phase of company loss has been almost entirely overlooked. Insurance of records is essential to every central-station company, and the quicker it can be brought about the better for every company in the industry.

Best Relay Practice Shortly Available to All

AMOST excellent treatise on relay practice in the form of the "Relay Handbook" will soon be made available in printed form by the N. E. L. A. Since control systems are the nerves of electric service plants, every company in the United States should find something of value in this compendium of practice—not theory. Much of the information which has been obtained on relay protection has been obtained through cut-and-try methods, yet operating companies which have not progressed very far in relay protection can be saved much costly pioneer work by acquainting themselves with the contents of this new handbook.

Southern California 220-Kv. System Operating

Is This the Beginning of a National Superpower Network?



THE Southern California Edison Company's 240-mile, 220-kv. transmission line from the Big Creek plants to Los Angeles, a tower of which is shown above, is now operating, and the supervoltage line of the Pacific Gas & Electric Company, it is reported, will be ready for operation in two or three months. Similar lines were proposed by Frank G. Baum before the N. E. L. A. this week for a national superpower network. The Southern California line, which has two 250,000-kva. circuits, is interesting aside from its voltage because of its having been converted from 150 kv. to the higher voltage. One operation involved in rebuilding these lines was to increase the tower heights, and the other required placing two additional insulators in each string and adding static or shield rings. Owing to load conditions it was impossible to spare more than a short section of each line at a time for reconstruction work.

Record of Progress Gives Inspiration for Future at Forty-sixth N. E. L. A. Convention

THE forty-sixth convention of the National Electric Light Association, held at the Hotel Commodore, New York City, this week, in attendance, interest and scope established a new record for accomplishment in the affairs of the organization. There were twenty-two business sessions, and a public policy meeting on Thursday night. This arrangement called for four parallel sessions and all were well attended. The convention was notable for the large number of leaders of public opinion outside of the electric light and power industry who addressed the convention during the week. These included well-known newspaper men like Melville E. Stone, counselor of the Associated Press; Don Seitz, publisher of the New York *World;* Bruce Barton, well-known editor and writer, and B. C. Forbes, editor of *Forbes Magazine* and financial writer for the Hearst newspapers. Five public service commissioners from as many different states and Dwight N. Lewis, president of the National Association of Railway and Utilities Commissioners, also contributed to the program the viewpoint of the regulators.

The investment institutions of the country were represented by Lewis E. Pierson, chairman of the board of directors of the Irving Bank-Columbia Trust Company, and Richard T. Ely, professor of economics at the University of Wisconsin, spoke on closer relationship between educational institutions and public utilities. Water power was discussed from different angles by Gen. Guy E. Tripp of the Westinghouse Electric & Manufacturing Company and O. C. Merrill, executive secretary of the Federal Power Commission.

The association has made a determined effort, through rural papers and through numerous committees, to get into closer touch with the farmers of the country so as to gage their requirements as well as to inform them on certain phases of the electric light and power business. The rural-lines committee exerted its best efforts in this behalf, and in addition to its report O. E. Bradfute, president of the American Farm Bureau Federation, representing a million farmers, addressed the convention on Wednesday morning.

The chief speaker at the public policy committee meeting, held at Carnegie Hall on Thursday night, was Julius H. Barnes, president of the Chamber of Commerce of the United States of America, who dwelt on the social and economic aspects of American electrical development and the philosophy of individualism.

With so large an attendance special arrangements had to be provided for handling the crowds and looking after their entertainment. In this regard the public utility companies in the metropolitan district of New York were very generous. Through the courtesy of the American Telephone & Telegraph Company, the General Electric Company, the Westinghouse Electric & Manufacturing Company and the Western Electric Company the proceedings of the public policy meeting on Thursday night were broadcasted throughout the country. To handle the telephone messages a system capable of handling the traffic of a city of fifteen thousand people was installed temporarily in the Commodore Hotel. This constituted one of the largest private telephone installations ever undertaken.

Opportunities of the Industry

Need for Power Still Challenges Central-Station Companies to Supply It—National Survey Suggested—Section Chairmen Report on the Activities of the Four Big Divisions

ALTHOUGH the convention got under way on Monday afternoon, after a luncheon to N. F. Brady and an ovation to Thomas A. Edison, who appeared at the opening session of the Public Relations National Section, its formal opening took place on Tuesday morning. At that time Mayor John F. Hylan of New York welcomed the convention to the city and expressed the hope that its streets would be as brilliantly illuminated as Luna Park on Coney Island before his term of office expired.

President Frank W. Smith in his address at the opening session gave a survey of general conditions throughout the country and their effect on the elec-

trical industry. In his estimation the outlook for the electric light and power business is exceedingly promising. Electrical output, he said, has doubled every five years for the past three five-year periods, and he saw no indication of diminution at this time nor for some time to come.

"Power is essential to industry, and the growth in physical volume of production at present indicates a rate of industrial recovery almost without parallel in American business.

"This development and industrial activity have involved a great increase in the output of electric light and power companies and necessitated large outlays for new equipment and construction. During the first four months of this year the electric light and power industry raised for all purposes 60 per cent more money than it did during the similar period of 1922, indicating that for the current year bond and stock flotations will reach over a billion dollars, compared with $750,000,000 last year.

"The output of electrical energy is even more imposing. The first three months of this year show an increase over the first quarter of last year of nearly 33 per cent. Up to the present time the growth of our industry has been limited to demand. There has been for many years no great surplus of electric power.

Mr. Smith said that bankers, financial institutions and the investing public throughout the country are holding public utility securities—and particularly those of electric light and power companies—in more esteem as investment mediums than they have ever done before. This attitude is the natural outgrowth of bettered operating conditions and is due in large measure to the improvement in public feeling toward the utility companies.

FRANK W. SMITH
Retiring President

M. H. AYLESWORTH
Executive Manager

Membership

The membership committee, Howard K. Mohr, chairman, has been functioning along the lines laid down by its predecessor. The changes that have taken place in the various classes of membership during the administrative year were shown in the following table:

Class of Member	April 30, 1923	April 30, 1922	Net Change
A	1,057	1,134	—86
B	8,336	8,110	193
C	111	93	16
D	219	237	—22
E	1,087	976	103
F	196	188	4
G	315	227	95
Foreign	66	64	2
Total	11,387	11,029	305

National Survey Suggested

M. H. Aylesworth, executive manager of the association, outlined a plan for better public relations through a nation-wide survey to be made under the auspices of the national association, and the convention voted to make the plan effective at once. The purpose of the survey will be to inspect each customer's equipment at some time during the year to determine whether the service is satisfactory or not, to receive suggestions for its possible improvement, and to ascertain what appliances are in the household, and if all of these are not in use, the reasons therefor. While the main purpose of such a survey is to cultivate better public relations with customers, the by-products are, in Mr. Aylesworth's opinion, of inestimable advantage.

"While we have been making great effort to obtain popular support by enlisting financial co-operation through customer ownership and are giving excellent service to customers in so far as they utilize the service, it must be appreciated," said Mr. Aylesworth, "that empty lamp sockets earn no dividends, nor does household apparatus that is not in use."

To serve well and ever better has long been the object of the electric light and power companies, for service and success are synonymous. But have we convinced our customers of this fact? Are they satisfied with our service? Do they believe in our sincerity, or are they skeptical and hostile, basing their unfriendliness on little things that could easily be put right, or founding it on ignorance of our methods and exaggerated notions of our earnings?

"Wonderful as have been our success and development, such a national survey under the guidance of your association offers still greater opportunities for service."

Chairman Sands' Report

In reviewing the work of the Public Relations Section, Chairman H. T. Sands pointed out that central stations as an industry have been peculiarly lax in spreading the public utility gospel from the speaker's platform. "I know of no industry," said Mr. Sands, "which has a better story to tell or a story that will prove more interesting to the public when rightly told. Furthermore, the work of the speakers' bureau forms a splendid auxiliary to the work of the state committees, for invariably, whenever a public address is made before civic bodies, the local newspaper devotes very liberal space to publishing that address, and in this way the maximum amount of publicity is obtained.

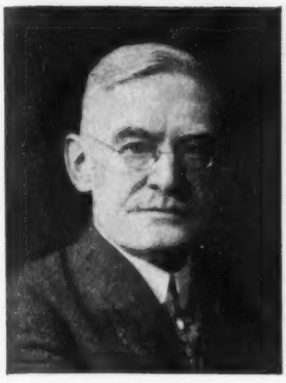
"Under the direction of the Public Relations Section, two films, 'Back of the Button' and 'Yours to Command,' have been produced and quite generally distributed among our member companies. This distribution, however, falls short of what it should be. Here again our industry shows a peculiar trait of reticence, and almost an inability to understand the public mind.

"In the prosecution of its work," continued Mr. Sands, "the section has been somewhat handicapped owing to the character of its purpose. In the main we are dealing with intangible factors in the prosecution of our work, but we are, nevertheless, able to observe certain tangible results, and it is our belief that these results will become more and more apparent as the work goes on. Our greatest obstacle in securing these results lies in the apathy and indifference of many of our own company executives. Absorbed in the technicalities of their business, deeply interested in the rapid strides which the industry is making, they seemingly fail to realize that the public mind has not kept pace with the changed conditions of the industry, and they are not bidding for that intelligent understanding on the part of the public that makes for mutual confidence and spells success."

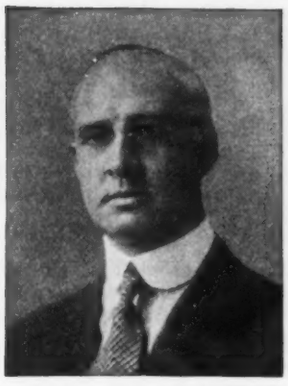
Mr. Sands regretted that some executives look upon public relations as a beautiful theory but without practical value. But public relations, he said, are neither a theory nor an idle dream. They are a pressing reality, the central station's greatest asset, to realize which should be the chief concern of executives.

Broader Engineer Viewpoint

"Altogether too much emphasis is put on the names of the sections," declared R. F. Schuchardt, chairman of the Technical Section, in his address on the opening day of the convention. "There seems to be a feeling that the main purpose of these sections is to concentrate entirely on the problems of the section. This view tends very much to develop specialists of the limited-view type which some of our philosophers think is actually endangering civilization. We should make every effort to see that these specialists are of the broad-visioned type who not only work out the solutions of their special field but who also consistently remember the relation of this field to the rest of the industry. The danger is perhaps greater in the so-called technical field



JOHN BRITTON
First Vice-President



J. E. DAVIDSON
Second Vice-President

R. F. PACK
Third Vice-President

H. T. SANDS
Fourth Vice-President

Four Vice-Presidents Elected to Serve with President Johnson

as distinct from the so-called commercial. Technical operation is successful only when the commercial phases receive due consideration. Would it not be well for all of us to encourage the sections to emphasize the 'relation to the industry' phases of their work a little more and the self-contained unit idea a little less, and would it not also be well to bring the sections together for joint consideration of problems at as many points of contact as possible?"

A word was also addressed to executives who have not yet given much thought to the value of N. E. L. A. committee work and who do not fully realize the intimate relation existing between the work of their technical staff and their dividends. "In addition to the valuable information obtained from these committees," said Mr. Schuchardt, "they offer an advantage of even greater value, namely, as training schools for your men, as a means for developing and inspiring your executives of the future. Here these men have the benefit of the broadening influence of meeting with others who are working on similar problems. With the well-organized plan of geographic divisional committee work and its coordination with the national committees it should be easy for every member company to partake of the benefits, even to the smallest companies.

"During the past months a new scheme of distribution for the information gathered by the committees has been worked out which should prove very satisfactory. It will get the reports promptly to the men interested and will greatly simplify convention reports." In general, this will be accomplished by making committee work a continuous function. Reportswill hereafter be made throughout the year and distributed in "homeopathic doses" so as to reach promptly those who are interested. "Executives receiving these reports will naturally refer them to those in their organization who can use the information most effectively for their company," added Mr. Schuchardt.

"The engineers who have caught the spirit of progress, as those must who act on these committees, appreciate that they are serving well only if they strive constantly to use the nation's resources in a manner which best conserves the interests of their fellow-men. They study the best engineering developments all along the line, think ahead, build and operate so that our product—electricity, the lifeblood of industry and the new servant in the homes—may be provided most economically and satisfactorily."

Promising Outlook for Commercial Expansion

Oliver R. Hogue, chairman of the Commercial Section, in his address said that the central station company's opportunity to increase its income has never been better in the history of the electrical industry than at the present moment. There is a marked improvement in station capacity; the financial situation is materially better; the opportunity for greater expansion is at hand. Commercial departments are reorganizing their selling forces and striving to improve their efficiency. Others who had abandoned commercial activities are reorganizing their commercial staffs.

The question of public relations is squarely up to the commercial man. The salesman who sells proper equipment and appliances to the customer without misrepresentation, will build up right feeling and understanding with customers, who in turn will buy goods and make investments, stalling plans for public ownership.

Adoption of Uniform Accounting

Calling attention to the very satisfactory progress made during the past year in the adoption of the uniform classification of accounts by public utility commissions of sixteen states, William Schmidt, Jr., chairman, summarized briefly the work of the Accounting National Section. His detailed report was presented in full at the first accounting session.

Water Power and Rural Service

National Importance of Adequate Development of Hydro-Electric Resources by Private Initiative—The Farmer Looks to the Electrical Industry for Service

TWO papers were presented at the Wednesday morning session on water-power development—one by John A. Britton of the Pacific Gas & Electric Company, reporting for the water-power development committee, and the other by Gen. Guy E. Tripp of the Westinghouse Electric & Manufacturing Company. Mr. Britton traced the phenomenal interest in water powers and in their development since the passage of the federal water-power law and showed by statistics the horsepower and cost of the work now under construction in this country. He also showed to what an extent the United States exceeded all other countries in the amount of water power developed.

Tripp Predicts a New Era of Development

"In striking contrast to all other public utilities, the electric light and power industry, I am convinced, is about to enter into a new era of development," said General Guy E. Tripp, in his address before the public policy session. The railway, telephone, telegraph and gas industries have, he said, become settled enterprises. They will continue to grow as the country grows and will from time to time improve their methods, but in all probability none of them will be called upon to furnish a radically new kind of service to meet the increasing requirements of our highly organized social life. But with electric power the case is quite different. Power is the basis of civilization. Without it men could not have emerged from barbarism. Nor can we make any progress except when notable improvements are made in our power supply. In order adequately to develop this power supply, the so-called superpower systems must be made accomplished facts. These systems will

utilize all the water powers that are available for economic development. They will render service more reliable and will allow steam-power plants to be built in the most economical and most suitable location.

These superpower systems, General Tripp said, will become vital to our national prosperity, and they must of necessity be monopolies; but also they will be shining marks of the advocates of government ownership. It so happens, however, that, regardless of the merits or demerits of the theory of the public ownership of the utilities as an abstract proposition, the government ownership of a power system of this magnitude is impracticable. Superpower systems must have no political boundaries, and any attempt to keep their lines within arbitrarily chosen limits will merely result in destroying them as superpower systems and depriving the public of the chief economic advantages that they offer.

National ownership, on the other hand, may at first sight seem entirely feasible, but analysis shows that great difficulty exists here also. In the first place, the authority of the federal government does not extend beyond national lands, boundary waters and navigable rivers. It could not, under present laws, control the power developed by non-navigable streams, to say nothing of the necessary steam plants. Any attempt on the part of the federal government to extend its control would be promptly resisted by the states with the support of public opinion, which sees danger to our republic in the growing tendency of the federal authorities to interfere in local affairs.

Therefore, if the nation is to have superpower systems, they must be built by private capital and operated by private companies. Government ownership in any form would be fatal to that development and disastrous to the best interests of the public.

Each new municipal plant that goes into operation and each new obstructive state law, like that of Maine, prohibiting the export of water power, presents one more obstacle to the completion of the general plan. It is most pleasing to note the broad-minded water-power policy of Governor Pinchot of Pennsylvania, and it is encouraging to remember that the New York State Legislature did not adopt the policy of hoarding the state water power. But, nevertheless, there is altogether too much sentiment in favor of the government ownership of electric light and power utilities, and especially of water power, and the growth of this sentiment can be stopped only by making the people clearly understand the fundamental policy involved in it and by proving by service that private ownership and operation is, from the standpoint of the public, the better way.

Rural Lines

The rural lines committee (G. C. Neff, chairman) paid less attention to rates and financing of lines than to the use and value of electric service on the farm, for it is believed that if sufficient use can be made of central-station service, the rate and financing problems will automatically take care of themselves.

A meeting was held with representatives of the United States Department of Agriculture, American Farm Bureau Federation and American Society of Agricultural Engineers, and a comprehensive study of the farm power problem was outlined.

The various interests represented perfected the organization of a committee on electricity as related to agriculture, with J. W. Coverdale of the American Farm Bureau Federation as chairman and G. C. Neff, chairman of the rural lines committee of the National Electric Light Association, as secretary.

The following investigations are to be carried on under general supervision of this committee: (1) Farm power survey; (2) survey of central-station and isolated-plant services to farmers; (3) survey of agricultural uses of electricity in foreign countries; (4) experimental and research work on the uses of electricity in agriculture.

The report presented a series of tables and a detailed discussion of the cost of rural electric service and methods of charging based on experience in territory served by the Union Electric Light & Power Company of St. Louis.

There are three things that have hampered the development of farm stationary power:

(a) At present there is very little farm machinery made that has been primarily designed to be used with the electric motor.

(b) The farmer, on account of being pressed for time and because of the character of his equipment, has had to devote almost his exclusive attention to any machine that happened to be in use.

(c) While much work has been done by the experimental stations in running tests, the machinery for getting this information to the farmer has not been set in motion.

The inquiries of the committee brought to light many subjects that should be investigated. Field power is used abroad, but has not been used much in this country. The electric truck for farm use and short hauls would seem to be worthy of consideration. Experiments show that electricity is of value in fertilization of fields and that it can be used in sterilization to stop bacterial action in silos.

From the comparatively small amount of work and investigation which had been achieved, the committee was of the opinion that with the development of proper electrically driven farm equipment and machinery a greater use will be made of electric service by the farmer, which will result in larger profits to him and to the utility which serves him. During the development period it will be necessary to treat the rural electric service as a special service and it is well to have specific rules covering the supplying of rural electric service, and as a guide to these rules the committee recommends a study of the various rules shown in last year's and this year's report. These rules, however, are of a temporary nature and can be eliminated when rural electric service has developed to a point where the revenue received bears a ratio to the investment comparable with the same ratio in urban business.

What the Farmer Seeks

One of the most interesting talks of the week was that given by O. E. Bradfute, president of the American Farm Bureau Federation, an organization representing a million farmers. Mr. Bradfute said that there was invested in the farms of this country eighty billion dollars and that the value of the food products raised yearly ranged from twelve to fifteen billion dollars. As indicative of the viewpoint of the farmer toward the question of electrical supply, Mr. Bradfute said:

"No one who was not born and reared on the farm can realize what it means to the farmer and his family when for the first time he presses the button and sees his home, lawn, barns and yards suddenly spring from darkness into a full noonday light and the activities of the farm take on, as it were, new life. When the farmer's wife enjoys the experience of the electric sweeper, full electric laundry equipment and the sewing-machine motor, and the family has the experience of a modern bathroom and the convenient kitchen sink with hot and cold water under pressure, these things alone give a trial of electricity which they will never after be willing to surrender, because it makes it possible for the farmer to have all the modern equipment in his home that may be found in the best city homes, and he feels at last that he has an even chance with his city brother in the social comforts of life. This simple test of electricity in his home leads him on with deeper interest as he begins to think of the possibilities of electricity if it could only be harnessed for general farm purposes.

"It is claimed," said Mr. Bradfute, "that modern farm machinery has increased the efficiency of the American farmer 20 per cent in the last decade. It is not unreasonable to expect a similar increase in efficiency in the next decade, and we no doubt should expect electricity to play an important part in accomplishing that result."

Speaking of water power, Mr. Bradfute said: "God has equipped America with many fine rivers and streams well scattered over the entire country. He must have had in mind the electrical age and surely intended that we should harness that great power now going to waste and wisely distribute it to all the people.

"I believe that a great majority of the farmers who own and live on their own farms believe in private ownership of public utilities under reasonable and fair regulation rather than municipal, state or federal ownership."

Merchandising Policy

A detailed analysis of the profit and loss entailed in the appliance merchandising operations of eleven central-station companies covering the first three months of this year was presented by John F. Gilchrist, chairman merchandising policy committee, this being a study supplementary to the statistics which were published last year by the joint committee on merchandising policy of the N. E. L. A. and the Edison Association. The Accounting Section at the committee's request prepared a revised classification of accounts and appointed a sub-committee to supervise the installation of this system in the eleven organizations which are cooperating in the analysis. The figures presented are approximate for the first six weeks while the system was being developed, but for the rest of the term are accurate and by the end of the year will provide a very exact statement of the merchandising experience of these companies.

The net sales of these eleven companies were $1,892,935.45, which represents 100 per cent of sales income. The gross profit, or excess over the cost of material in the dealers' warehouses, was $587,616.32, or 31.1 per cent of the net sales income. The total selling expense of the eleven companies was $422,360.65, or 22.2 per cent; the general expense $358,038.36, or 19.0 per cent; the fixed charges $39,540.71, or 2.1 per cent, and the net loss of the group, after deducting the gain of those companies which show a gain from the aggregate losses of those which show a loss, was $232,323.40, or 12.2 per cent.

The margin over cost of merchandise is greater than the corresponding figure obtained approximately one year ago from the same group of companies. In the opinion of the committee, this indicates two things—that the companies themselves are appreciating the necessity of withholding goods from their counters which cannot be bought at a price to yield them a fair margin above cost of merchandise, and that manufacturers and jobbers are rapidly awakening to their own interests and are readjusting their prices so that retailers may enjoy more of a margin between the list price established by the manufacturer and their costs.

Average sales expense may be slightly larger than expected by most students of the situation, but it is probably more nearly as expected than the 19 per cent representing the general expenses. On the other hand, with more information gained from this cost-accounting record as the months go by, it is quite likely that the item representing general expense will increase more rapidly than that representing sales expense, as it is in the general expenses of the business that the expenses of merchandising are to the largest extent absorbed by the other branches of the utility business.

The committee believes it must be apparent to all who have made any study of this question that the margin over cost of merchandise is insufficient, when the cost of securing the proper volume of business which a territory should properly yield is taken into consideration.

These figures are calculated on the basis of what the normal costs would be if this merchandising business were being conducted as a separate enterprise and not as a department of a central-station company.

Company Employees' Organizations

This committee, of which Robert B. Grove is chairman, expressed its belief that the national association can function in a valuable way by endeavoring to render service to employees of class A members and to managers of class A member companies in their relationships with their employees, and further, that this function can best be performed by a national general committee composed of members broadly representative of employee organizations.

The committee hoped that the action of the national executive committee on the recommendations of last year's committee would be favorable to the development of company sections and, in any event, recommended that the preparation of the suggested handbook be undertaken.

The El Paso company section of the N. E. L. A., El Paso (Tex.) Electric Railway Company, was formed during the year, and the United Electric Light Company of Wilmerding, Pa., requested authorization of the national executive committee to form a section.

Publicity for Public Utilities

Melville E. Stone, counselor of the Associated Press, spoke of the proper relation of public service corporations to the newspapers. He intimated that there was no reason why public service corporations should not be proud of their work and admonished his hearers to play a fair game and not be moved from a course of rectitude by the blackmailing legislator or menacing newspaper. Mr. Stone said the jury which will pass on the merits of the case is the public and the public is not easily fooled, nor is it disposed to be unfair. Before such a jury the rascally editor has just as much to lose as the utilities. He was opposed to purchasing favorable editorial comment with useless advertising. "If you have occasion to advertise," said Mr. Stone, "do it on purely business principles; that is, advertise with a newspaper when and only when you are seeking a legitimate return. Never advertise merely as a sop. Such advertising is discreditable alike to the utilities and to the newspaper man. It always arouses a suspicion on the part of the discerning reader that you are seeking something you should not have."

Mr. Stone expressed himself as opposed to government ownership on economic grounds. Government ownership, he said, has been often tried and almost always proved expensive and inefficient. He believed, however, in honest and intelligent governmental regulation and said it was silly to attempt secrecy in the conduct of a public service corporation.

Commissioner Dwight N. Lewis Speaks

President of National Railway and Utilities Commissioners Voices that Association's Belief in Private Operation—L. E. Pierson Gives Banker's View of Utility Management

AN ADDRESS by Dwight N. Lewis, president of the National Association of Railway and Utilities Commissioners, was a feature of the third general session, which was all devoted to public opinion and executive relation to some of the newer phases of utility management. How to reach the public through the schools or universities was one point emphasized.

Private Ownership Preferred

Mr. Lewis said that he was conscious of speaking to trained men representing billions of capital and a public service that has rapidly been metamorphosed from a luxury to a necessity. He said that many state commissions are still on trial, and this past winter has brought forth determined efforts on the part of some people to have utility commissions abolished. Bills were introduced in many legislatures to bring such abolishment about, but the legislatures have all adjourned and the ranks of the utility-regulating commissions are still unbroken.

Much of the discontent with state-regulating commissions arose because of the fact that war-time conditions made it imperative that rates in some instances be advanced. Increased cost of coal, materials and labor made changes in rates absolutely necessary. "It may be said to your everlasting credit," said Mr. Lewis, "that electric utility rates did not advance in the same measure that other prices advanced during the war period of high prices."

According to Mr. Lewis, there is yet a considerable portion of our population who believe in municipal ownership of public utilities. "I am," he said, "a firm believer in public ownership, in consumer ownership, of a private company efficiently operated in the interest of the consuming public as well as the owning public. The government should concern itself with purely governmental affairs, protecting both persons and property in their constitutional rights, and leave to private capital and initiative the advancement of business affairs. The rights of the public may always be secured by proper oversight and regulation, and this

should not go so far as to destroy incentive for investment of capital and talent.

"I am informed that many towns in my own state, tiring of the burden of municipal ownership, are discarding their expensive and obsolete plants and are obtaining their supply of electricity from central distributing plants, much to their pecuniary profit and satisfaction in service. There is every

DWIGHT N. LEWIS
President National Association Railway and Utilities Commissioners

reason to encourage the building of super-power plants. More efficient management and operation, conservation of fuel and lessened overhead expense mean better service at less cost to the consumer."

Conservative Expansion Recommended by Customer Ownership Committee

That the great and growing customer-ownership movement may go forward under sound policies, member companies pushing this invaluable work should at all times keep it in conservative control, the customer ownership committee, through its chairman, M. R. Bump declared. During 1922 it is estimated that electric light and power securities totaling $175,000,000 were placed in the hands of customers, compared with $80,000,000 in 1921, and this year it is probable that the aggregate total of customer ownership sales will reach a quarter of a billion dollars. The committee wished to go on record as to the necessity of conservatism in the creation of issues in every reasonable way in order to prevent the possibility of a failure of any of these securities to pay dividends regularly. A comparatively small number of such failures would do an enormous amount of harm to the customer-ownership movement as a whole.

In the past eight years at least 425,000 customers have been attracted to the possibilities of investing in local company securities. The gain in numbers is extremely rapid, and it is estimated that within three years at least one million people will own the securities of the electric companies serving them. The committee recommends that the incoming administration give serious consideration to the preparation of a series of statements to customer-owners that will broadly outline the economics of the utility situation and help in an educational way in the solution of the industry's problems. To overcome the indifference of customer-owners in some localities, it is recommended that group meetings in convenient neighborhoods be held from time to time where company executives may meet with customer-owners and discuss their problems, and that attractive company booklets and statements be sent these customer-owners at stated intervals.

The committee feels that it is undesirable for any company to guarantee the future market price of securities sold. Every company should attempt to maintain at all times an active market for the resale of securities. The cost of distributing securities is becoming lower each year. The committee recommends that the sales manual be revised to date.

DATA ON CUSTOMER OWNERSHIP

(Summary of information from 156 Electric Light and Power Companies)

Total population of territory served	40,899,096
Total number of customers	7,698,313
Gross earnings of combined companies reporting	$555,553,901
New stockholders obtained from customer-ownership plan	426,495
Shares of stock sold under customer-ownership plan*	3,449,185
Percentage of sales on deferred-payment plan (average)	32.5
Percentage of stockholders obtained through customer-ownership plan to customers	5.5
Average cost of selling per share as reported by seventy-five companies†	$4.39
Ratio of stockholders to population	1 to 95
Shares sold to customers, 780,438; employees, 150,511; others, 125,491.	

(Only fifty-eight companies reporting on this item)

SUMMARY BY YEARS

Year	Shares of Stock Sold*	Stockholders Obtained
1914	92,310	4,044
1915	57,103	4,357
1916	38,057	3,681
1917	79,348	7,470
1918	30,783	4,115
1919	166,096	20,840
1920	416,089	62,885
1921	802,845	118,177
1922	1,750,707	198,018
	‡3,433,338	‡423,587

* Stated in par value of $100 per share.

† In report of average cost of selling the lowest was 5 cents per share, which included postage and printing circular letter. The largest amount was $9.64 per share, including commission, advertising, transportation, general office expenses and salaries.

‡ These totals do not check with the summary above because of the fact that some companies failed to list the data by years.

Utility Management

If the electrical utilities were to cease functioning for a single day, said Lewis E. Pierson of the Irving Bank-Columbia Trust Company of New York, modern life as we know it would come to a sudden halt.

In this fact lies the basic reason for the interest of the public in the conduct of the electrical industry and for the public's right to demand that the industry shall be efficiently and intelligently administered.

On the other hand, the same fact places a great and pressing duty upon the industry—to protect itself from the imposition by the public of policies and theories the result of which would be to cripple the essential instruments of public service.

The world's experience with public utilities is comparatively brief. It has experimented with various forms of government for thousands of years and as yet has evolved nothing which even approaches perfection. The sum total

LEWIS E. PIERSON
President Irving Bank-Columbia Trust Company

of its knowledge of public utilities covers less than a century.

Thus far three major ways of managing and operating public utilities have been attempted: First, private ownership and operation without governmental regulation; second, public ownership and operation; third, private ownership and operation subject to governmental regulation.

The first two have proved to be undesirable in a number of ways. Public ownership and operation, however, has in practice proved even worse than private ownership without regulation. Out of the failure of government ownership and operation and the disadvantages of unregulated private ownership and operation has been evolved the third method of dealing with public utilities, namely, private ownership and operation subject to regulation by a commission representing the public.

In theory this method presents the most effective method yet devised for safeguarding the administration of public utilities. Practice has proved what theory indicated. Wherever the commission idea has had a fair trial through the appointment of officials of intelligence and character service has improved and the utilities have made progress. The electric light and power industry is today contributing to the comfort and prosperity of the country nineteen times as much as it contributed twenty years ago.

Education and Research

In an address on this subject Richard T. Ely, professor of economics, University of Wisconsin, told of the possibilities for a better government and a better civilization through having the youth of the nation better educated in the fundamentals of the great utility business.

"I know something," he said, "of the vision as well as the achievement of the men in the electric lighting field. But we are only at the beginning. Farm and factory, homes in city and country, are going to receive increasingly the benefit of the growing marvels of electricity."

In Dr. Ely's opinion it is a privilege that educators may well crave to help realize the vision which animates the spirit of the leaders in the industry.

Accident Prevention

In reporting for the accident prevention committee, its chairman, Charles B. Scott of Chicago, said that accident prevention in the electrical industry has passed from the experimental stage into one where it is an integral constant factor in every operation. Detailed reports were made on educational courses, resuscitation, health promotion, suggestion systems, usefulness of statistics, radio hazards, automobile hazards, grounding and its relations to accident prevention, locking doors in high-tension compartments, electrical apparatus and risks peculiar to hydro-electric plants. Mr. Scott said that these reports should be useful to the supervisory forces of member companies and recommended that they be placed in the hands of key men and be made a part of operating plans.

Great Savings in Insurance

E. Wolff, reporting for the insurance committee, gave an excellent account of the work of the committee and the large savings in insurance premiums which it was able to effect. He recommended that the insurance activities of the association be consolidated under the direction of a member of the headquarters staff in order that such work may be fully co-ordinated.

The reduction in the fire insurance was approximately 25 per cent and for auto-trucks 31 per cent. From reports received from ninety-one companies a saving in premiums of $103,769 was reported. The lowest reported was $25 and the largest approximately $25,000, the average being $1,140.

President Smith, in referring to the committee's work, said that through its activities it had been able to save to member companies a sum of money exceeding the annual dues which these companies paid into the association.

Army Engineers Co-operate

Reporting for the committee on electrical resources of the nation, M. S. Sloan, president of the Brooklyn Edison Company, told of the co-operative work of the Great Lakes Division, N. E. L. A., with the Chief of Engineers of the United States Army in compiling basic information on the electrical resources of that division. Mr. Sloan recommended that the government be provided with an accurate statement of present resources as well as an estimate of prospective growth, so that in time of shortage such as existed in 1918 definite and accurate information will be instantly available.

Simplification and Standardization

Gen. George H. Harries indicated in his report of the committee on contact with the Department of Commerce just what can be accomplished by unification of effort in any industry. The survey of waste in industry showed the need of elimination of losses, and Secretary Hoover in seeking a man to head his department for simplification naturally took him from the electrical industry, which for economy and reliability's sake has practiced simplification for years.

President Smith Commended

John W. Lieb, reporting for the committee on the president's address, commended President Smith for the unusual grasp of the problems of the association and details of the industry which his report indicated he possessed. The intimacy showed in his review of national and geographic section work, Mr. Lieb said, was gained by personal contact and proved the desirability of having officers and members of the staff headquarters making observations in the field. The committee commended the survey of general conditions made by Mr. Smith, stating that it sounded a note of confidence and optimism concerning the industry's future.

Memorials

The report of the committee on memorials was made as usual by W. H. Onken, Jr., editor of the ELECTRICAL WORLD, and as a mark of respect the convention stood with bowed heads for a moment in memory of those who died during the year.

The Utilities and American Initiative

Public Policy Session Listens to Julius Barnes and to Public Policy Committee Report—Charles A. Coffin Medal Awarded to Southern California Edison Company

A LARGE audience was present in Carnegie Hall Thursday night to listen to the address of J. H. Barnes, president of the Chamber of Commerce of the United States of America, and to the report of the public policy committee, of which Martin J. Insull of Chicago is chairman. This report is given in abstract elsewhere in this issue.

The serious portion of the program was preceded by organ selections by M. E. Schwartz and by songs sung by Miss Anna Case. From a popular standpoint great interest centered in the meeting because of the remarkable use of radio broadcasting.

American Inspiration and Initiative

Mr. Barnes' talk was highly inspirational and instructive. He told of the great part electricity plays in modern life and in individual production, and was insistent on the prerogatives of American traditions and institutions and on the exercise of private initiative and enterprise in the operation of public utilities and in the conduct of business in general.

Clinedinst, Washington, D. C.

JULIUS H. BARNES
President United States Chamber of Commerce

The speaker indorsed state regulation of public utilities and paid a glowing tribute to the electrical industry of America. The fairy tale of modern industry, he said, lies in the area of American electrical development.

When the great truth is grasped that the standard of the average home possession is only surely raised by producing more and more of the articles of common use to divide among these homes, then we get the human meaning that is shown almost without exception in all American industry under this typically American philosophy of larger and cheaper production.

The American philosophy may be fairly called the philosophy of fair play: that the individual shall not be deprived of his opportunity for superior accomplishment and superior fortune by the rigid and blind processes of a government which injects itself into natural processes, with disastrous results, nor deprived of that rightful opportunity by strong combinations of either influence or of wealth, or of monopoly created by government favor.

In the preservation of this field of fair play there has developed as the proper relation of government to private industry the American theory of regulation. America recognizes that free and open competition is the great safeguard to individual opportunity, and when for any reason the play of competition is checked, then the organized authority of society must, in the very preservation of fair play, interest itself.

It is manifest that, when the supreme authority of the state is called into play to secure rights-of-way for power transmission, or for transportation across reluctant private property, there is set up a peculiar obligation toward the established constitutional authority

which exercises that right of organized government over individual opinion and preference. So that the policy of regulation is one which is approved by common sense and grounded on the American passion for fair play and equal opportunity.

But, as always in the exercise of supreme public authority through public servants, who are but human, we have passed through phases which require correction. In our own self-preservation such regulation must be fair and even generous. We must preserve in publicly regulated but privately owned services the field of opportunity which attracts the superior grade of ability and resourcefulness.

It is only in the domain of public utility service and its regulation by constituted authority that we have failed to grasp fully the principle that that regulation must preserve the divine individual stimulus which inevitably translates itself into enlarged human convenience and happiness. This policy of regulation is in the stage of evolution. It must be tested in this direction and that. Abuses must be eliminated and the stimulants preserved and developed. Experimentation matters not so much if only that policy of regulation shall be animated by a public conception of its own self-interest and of the spirit of fair play which shall interpret the relation of government to this great industry.

Public Policy Committee

Martin J. Insull, chairman of the public policy committee, presented the report of the committee. The ideals of the industry as set forth in the report were loudly acclaimed and applauded by the audience. An extended abstract is given elsewhere.

Water-Power Development and Coal Storage

Secretary Merrill of Federal Power Commission Discusses Hindrances to Hydro-Electric Progress—Lieb on Coal Storage—Wiring Changes and Lamp Developments— Johnson Elected President

O. C. MERRILL, executive secretary, Federal Power Commission, in an address which was listened to with interest and warmly applauded, placed emphasis on certain tendencies which retarded development. He stated that new construction already completed or involved in projects upon which construction has already started aggregates 1,470,000 hp. of proposed installation. The aggregate total of estimated installation in the 173 projects for which permit or license has been issued is 7,600,000 hp. Tracing the marked change which has taken place with respect to the development of water power on navigable streams, which for fourteen years preceding the present law was virtually at a standstill, Mr. Merrill showed that on navigable streams alone 2,000,000 hp. is under construction or applied for.

He made it plain that at present there is no surplus power and that despite that fact and the urgent necessity of greater water-power development in the East, the greatest water-power source in the country, the St. Lawrence River, is running to waste and the second greatest potential source, the Colorado River, is likewise unused because of conflicts over jurisdiction caused by interstate jealousies, by strife between the advocates of public and private ownership, by existing or prospective embargoes on power transmission or by restrictive action by state legislatures.

Touching on the situation at Muscle Shoals, Ala., Mr. Merrill said that the nation has in the federal water-power act established a definite national policy, representing the mature judgment of Congress and the consensus of public opinion. He intimated that it is necessary to safeguard that law from attack if maximum and proper development of the water-power resources of the nation are desired.

Coal Storage Recommended

Reporting on the activities of the joint fuel committee during the recent coal and rail crises, John W. Lieb of New York, its chairman, told of the relief given to 225 companies which sought the assistance of the committee. He strongly urged member companies to store coal to the limit of their capacity so as to safeguard the service and at the same time relieve as much as possible the railroads of the company at the time of their peak loads. He also expressed the hope that public utilities would make contracts for their coal requirements and intimated that possibly public utilities might receive preferential treatment from Washington on contracts of this kind, insuring full delivery before operators could sell spot coal.

Wiring Methods

Standardization of appliance plugs and prongs, changes in the National Electrical Code, polarization of portable devices, tests of heater cords and improvements in wiring methods were particularly noted in the report of the Wiring Committee (R. S. Hale chairman) this year. At present, the committee declared, it is not desirable to insist that appliance prongs shall be of the same design for all classes of appliances.

Some of the advantages of the solid-neutral, 15-amp. fuse and 660-watt rules recently adopted by the National Board of Fire Underwriters, were outlined by the committee, which has been advocating them for some time. The principal benefit emphasized is the saving in installation cost in all new construction, of which there is an unprecedented amount going on this year. The solid neutral will make easier the use of a consolidated neutral or neutral bus in apartments, and office buildings with meters in the basement and numerous circuits.

Among subjects which the committee suggested for future work are the following: Listing and discussion of new methods which are improvements on present practice but are not of a nature

Growing Customer Ownership

Distinguished Leaders of Thought and Action Portray Accomplishments in This Direction and Point to Promising Future for the Policy

THE triumphs of customer ownership during its short career of nine years and the remarkable opportunities of the future in this branch of public relations work were set forth at the session of the customer ownership committee on Thursday afternoon, under Chairman M. R. Bump. The committee report emphasized the extremely rapid growth of this movement since the war and urged a continuance of the sound financial methods which have been so great a factor in its success throughout the country. John A. Britton, vice-president Pacific Gas & Electric Company, San Francisco, reviewed the rise of customer ownership from its inception by that company in 1914, pointed out its invaluable aid in the defeat of the California state water-power act at the 1922 election and described with telling force the bearing right public relations exert upon utility development. B. C. Forbes, editor *Forbes Magazine*, New York, gave an optimistic address upon the future of customer ownership and private management, urging continued care as to the quality of security issues offered to the public. E. K. Hall, vice-president American Telephone & Telegraph Company, New York, pictured the undeveloped investment field of the country and its attractiveness as a source of fresh capital for electric utilities. He urged making the utmost of the opportunities to develop friendly relations between utilities and owner-customers.

Louis H. Egan, president of the Union Electric Light & Power Company, St. Louis, spoke upon the desirability of broadening the security offerings placed before the public, the possibilities of preferred-stock absorption having in many companies been utilized up to the desirable ratio to other classes of securities. These addresses are abstracted at length elsewhere in this issue.

to warrant their being made obligatory by law or code; methods of standardizing interpretation of doubtful points in the code, and study of the general wiring situation and its probable development when all or nearly all the buildings in a district are connected to central-station lines.

Rate Research

The rate research committee reviewed a number of important rate decisions and rulings of the past year having to do with confiscatory rates, ordinance rates, special rates and relief granted by the United States courts. The necessity for cost analysis was again urged. Cost analysis will show whether any class of service did or did not earn last year its fair share of earnings. But it cannot take account of the interlocking and reaction upon one another of all existing classes of service. In brief, analysis should be a light on the road of business management; it should not supersede the intelligence which must guide our car along that highway.

The report discussed at length the decisions of the New Jersey, Wisconsin and California commissions that deal with the large question as to whether uniform rate schedules should be established throughout areas which are economic but not political units.

The committee said: "The trend of decisions and of practice continues to be toward reduction of the number of rate classes and the simplification of forms.

We do not foresee early uniformity in power factor clauses. The mechanical basis of credits and debits for power factor should be the metering by an integrating meter of the reactive component of the supply, and every power-factor clause should be designed to discourage bad power factor and encourage good power factor, and not to apportion meticulously the added costs due to a lower power factor of the electric system."

Attention is called to the recently published experience of the Hartford company,* with a residence rate composed of a fixed charge based upon floor area, plus a meter charge of 6 cents per kilowatt-hour, which composite rate was substituted in January, 1922, for a straight 10-cent-per-kilowatt-hour residence rate.

Co-operation with Telephone Companies

R. F. Pack reported progress in the co-operative work being carried on with reference to inductive co-ordination and other matters in which the electric light and power companies and the telephone companies are interested. The two utility organizations, he said, are working in full harmony, endeavoring to find solutions to certain definite problems. The element of suspicion and distrust, Mr. Pack informed the convention, has entirely disappeared.

*See ELECTRICAL WORLD, Feb. 17, 1923, page 412.

Activities of Joint Committee

A review of the work and accomplishments of the Joint Committee for Business Development since its organization was made by E. W. Lloyd of Chicago. The speaker outlined some of the savings which could be effected by co-operative effort and closer organization and said the "electrify" movement to which the joint committee is committed is not a temporary campaign. He asked that the joint committee be supported by every electrical association and interest in both the United States and Canada, stating that the running expenses of the organization were not large. In the estimation of the speaker the joint committee is essentially a consulting organization and serves its purpose when it brings its members together to consider a given proposition, no matter from what source it originates.

Lamp Standardization

The total sales of tungsten-filament incandescent lamps (excluding miniature lamps) in the United States during 1922 amounted, according to the lamp committee (W. W. Freeman chairman) to slightly over 200,000,000. This is a 25 per cent increase, over the 1921 sales of 160,000,000 and is within 1 per cent of the 202,000,000 sold in 1920.

The demand for lamps in the different voltage groups for the past three years is shown in Table I.

TABLE I—PER CENT DEMAND FOR LAMPS 1920-21

Voltage Group	1920	1921	1922
115	85.2	85.8	88.2
230	5.6	4.3	4.0
Street series	1.3	1.9	1.4
Street railway	3.2	2.6	2.0
30 and 60	3.9	4.7	3.5
Miscellaneous	0.8	0.7	0.9

Attention was again called to the recommendation that the use of 112-volt lamps should be discouraged.

The committee earnestly recommended that the question of complete standardization and unification be seriously considered by those companies which have not standardized as to voltage or unification of voltage of their systems.

American Engineering Standards

The purpose, organization and method of functioning of the American Engineering Standards Committee was outlined by S. G. Rhodes, executive member of the light and power group of the main committee, who explains that the organization is limited to the functions of fostering, encouraging and providing facilities for standardization originated by other bodies. Its purpose is chiefly to certify to the adequacy of the method of preparation.

Award of Prizes

Association prizes were awarded before the close of the convention as follows: The Charles A. Coffin medal to the Southern California Edison Company of Los Angeles, Cal., for excellence of station, distribution and transmission equipment, company organization and relationship with employees, public relations, and in recognition of its work in popularizing the use of electricity. This award was made at the meeting of the public policy committee and accepted on behalf of the company by John B. Miller, its president.

The Doherty gold medal for the best paper of the year was awarded to G. Bertram Regar of the Philadelphia Electric Company, the subject of his paper being "More Business Through Better Lighting." A. H. Heitzler and S. R. Finley of the Ohio Public Service Company of Massillon were awarded the Harriett Billings prize of $50 in gold, donated by Arthur Williams of New York, for their joint paper "An Analysis of Consumption by and Revenue from Domestic and Commercial Lighting Customers."

Officers Elected

On the recommendation of the nominating committee, the following officers were elected: President, Walter H. Johnson, Philadelphia Electric Company; first vice-president, John A. Britton, Pacific Gas & Electric Company, San Francisco; second vice-president, J. E. Davidson, Nebraska Power Company of Omaha; third vice-president, R. F. Pack, Northern States Power Company of Minneapolis; fourth vice-president, H. T. Sands, Charles H. Tenney & Company of Boston; treasurer, Walter Neumuller, New York Edison Company. Of the five members of the executive committee whose terms of office expired, W. A. Layman, Wagner Electric Manufacturing Company, St. Louis; E. W. Lloyd, Commonwealth Edison Company, Chicago; J. E. Strong, Tucker Electric Company, New York, and W. E. Robertson, Robertson-Cataract Electric Company, Buffalo, were re-elected to succeed themselves for a term of three years, and Harry Reid, Interstate Public Service Company, Indianapolis, was elected to succeed J. F. Owens, Oklahoma Gas & Electric Company. The other members of the executive committee, who continue in office, are: I. E. Moultrop, Edison Electric Illuminating Company of Boston; H. C. Abell, Electric Bond & Share Company, New York; E. W. Rice, General Electric Company, Schenectady; P. S. Arkwright, Georgia Railway & Power Company, Atlanta; E. M. Herr, Westinghouse Electric & Manufacturing Company, East Pittsburgh, and T. A. Kenney, Hodenpyl, Hardy & Company, also elected.

Election of members to the exhibition committee of the Class D manufacturers resulted as follows: E. R. Whitney, Commercial Truck Company, was elected for a term of two years; J. C. McQuiston, Westinghouse Electric & Manufacturing Company, Pittsburgh, for three years, and George A. Hughes, Edison Appliance Company, Chicago, for three years. N. C. Garland, Ohio Brass Company, New York office, was also elected.

Public Relations Sessions

Greater Executive Attention to Customer Contacts Evident—Utility Commissioners Help Public and Utilities to Understand Each Other

THE public relations section showed its virility by the program of its three sessions—one reporting the work of its committees, one devoted to a discussion of utility information bureau work, and one at which was presented a wonderful symposium by commissioners and utility executives.

Committee Accomplishments Discussed

Taking as his text "We shall know each other better when the mists have blown away," H. T. Sands, chairman of the Public Relations Section, declared that this thought might well be taken as the motto and purpose of all public utilities in their public relations work. The continued success of the central-station industry will, he said, be determined by the extent that a company is able to gain and hold the confidence of the public which it serves. Between the industry and that confidence all mists of distrust and suspicion have one common origin—the lack of understanding of the public utility business.

What the public utilities must strive for is a better understanding between themselves and the public—an understanding on the part of the public of the industry and its problems, and, what is equally important, an understanding on the part of the industry of the mental attitude of the public toward it. The first prerequisite step toward securing this better understanding must be taken within the utilities' own household. Many employees still hold ideas regarding the fundamentals of the public utility business that are just as vague, just as erroneous and sometimes just as ludicrous as those held by the majority of the public. The first step, therefore, is for the utility to put its own house in order. To do this the executives must take their employees completely into their confidence, inform them as to the important fundamentals of their particular company, tell them frankly of its capitalization, its franchises, the contribution it makes to the community in the form of taxes paid, the size of the investment and how the money is obtained.

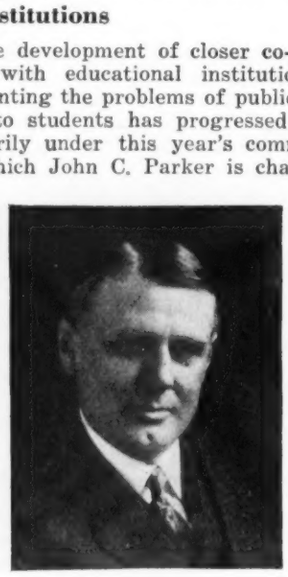
Employee Relations with the Public

The committee on employee relations with the public (L. B. Herrington, chairman) drafted a proposed employees' manual which in its preliminary form embraces several commendable features.

CUSTOMER OWNERSHIP
Every Dot Represents a City or Town served by Electric Light and Power Companies which have Reported to NELA the Sale of Securities under Customer Ownership Plan
Customer Ownership has added 425,000 Customer Owners in the Past Eight Years.
Including these, there are now 1,250,000 Owners of Electric Light and Power Securities.

Co-operation with Educational Institutions

The development of closer co-operation with educational institutions in presenting the problems of public utilities to students has progressed satisfactorily under this year's committee, of which John C. Parker is chairman.



H. T. SANDS
Chairman

Much attention has been given to determining how the needed public utility information could best be included in college courses.

With no attempt to influence or control, the association could well undertake to endow two or three professorships which would be intended primarily to facilitate research and secondarily to provide for the teaching of a series of public utility courses. Such a department would require an endowment of $20,000 to $30,000 a year. It was the belief of the committee that when the time is ripe for such an endowment the central-station industry could well afford the expenditure.

In view of the delicate character of the problem referred to the committee, it did not believe that any direct results could be produced in a hurry. None the less, the committee was persuaded that there is a very real opportunity to serve American education and incidentally strongly to benefit our industry. To this end the committee recommended that the following steps be taken:

(1) Compile a list of the schools at present giving public utility courses.

(2) Invite into conference with this committee a representative group of professors to determine whether our program will be acceptable.

(3) Communicate through a letter of inquiry to the school men, the country over, determining the acceptability of the proposed program.

(4) Prepare a general problem list for periodical dissemination to the schools.

(5) In special instances attempt to relate professors of economics with neighboring central-station institutions as source material for research.

(6) Discuss with the school men and formulate definite plans for a graduate group in public utility economics.

Manufacturers' Advertising

Manufacturers of electrical apparatus and equipment have again had a part in the association program of building

through publicity better public relations for central-station companies. In the reports of the manufacturers' advertising committee (P. L. Thomson, chairman), the willingness of various manufacturers to use a part of their space in publications to talk about central-station problems was commended. The committee expressed its appreciation of the efforts of appliance manufacturers to co-operate with the committee and indicated that more of this kind of advertising may be expected in the future. There has been a growing disposition among central stations to recognize that the other branches of the industry which perform an economic function in the distribution of merchandise are entitled to fair play and an opportunity to reasonable return. This has resulted in a healthier point of view on the part of manufacturers toward the operating companies and their prosperity.

A number of security houses have co-operated with public utilities by running advertisements recommending this class of securities for investment. In connection with individual offerings of issues, much has been said in advertisements in favor of utility stocks and bonds, and their wide popularity has been widely recognized by financial writers in the editorial pages of both magazines and newspapers.

Public Speaking

Back of the organization of the public speaking committee (A. C. Marshall chairman) is the theory that public utilities can no longer safely maintain an attitude of secrecy and mystery regarding the industry, and telling the story of utilities certainly is one of the best ways of informing the public and keeping it informed. During the past year a great deal of work along this line has been done through the public utility information bureaus and also by individual companies themselves. Among those which have done especially effective work are the Rocky Mountain Section public speaking committee, the New York Public Utility Information Committee, the Edison Electric Illuminating Company of Boston and the Michigan Committee on Public Committee Information; besides these a vast amount of work has been done in California under the leadership of S. M. Kennedy.

An important development during the past year was a series of lectures given by Carl D. Jackson, former president of the National Association of Railway and Utilities Commissioners. At educational institutions he spoke on general economic problems and brought the utility industry into his talk in a most interesting way. He also addresed bankers, editors, state and city officials and presidents and members of faculties of several educational institutions. This was thought by the committee to be the largest thing done this year.

Information Bureau Organization

Public utility information bureaus have been organized in twenty-two states, their activities covering in all thirty states according to the report of the organization committee (H. C. Abell chairman). Bureaus are now functioning in the following states: Illinois, Indiana, Kentucky, Iowa, Ohio, Nebraska, Missouri, Oklahoma, New York, Kansas, Wisconsin, Michigan, Georgia, New England, Maine, New Hampshire, Vermont, Massachusetts, Alabama, Louisiana, Mississippi, Rhode Island, Connecticut, Colorado, Wyoming, New Mexico, Tennessee, Texas, Washington and Pennsylvania.

Organization of bureaus in four additional states is now under way, and work is in progress in other states.

Relations With Financial Institutions

During the past year the committee on relations with financial institutions (M. S. Sloan chairman) has been working almost entirely on an effort to draft a law which can be introduced into the Legislature of the State of New York legalizing investment by savings banks in the securities of electric power and light utilities and also of gas and telephone utilities. The draft of the law has finally been completed and is ready to submit when it is deemed advisable.

In the consideration of this bill more or less discussion developed in connection with other types of utilities, particularly the electric street railway companies. It was found that, in view of the unfortunate condition existing in in the past few years from which the street railways are now emerging, the opinion of the savings-banks representatives was that they were not convinced of the advisability of including the electric street railways in this bill.

Women's Public Information

The work of the women's public information committee (Miss O. A. Bursiel, chairman) was handled most effectively by dividing the work geographically. Efforts of this committee have been directed to promoting the plan of informing women within the industry about the public utility business as a whole and their own company in particular. A great deal was accomplished by talks given by heads of departments and by means of inspection trips over the properties of the various companies.

In some instances the activities of the women's committee have been carried into universities and women's clubs. However, while the committee believed that its educational activities might be carried into a wider sphere, taking in women outside of the industry, there remains much to be done in the education and information of those now within the industry. It was recommended that future organizations should not undertake to formulate new lines of instruction so much as to utilize what has already been developed and worked out through experience.

After the presentation of the various committee reports, L. D. Gibbs outlined the work of the Edison Electric Illuminating Company of Boston during the past year in showing a moving picture entitled "Edison Service," which had been accompanied each time by a lecture given by one of the company employees. In all, more than two-hundred thousand people in the company's territory have seen the film. The session closed with a presentation of the film as an illustration of what the central station can do to present its story to the public.

Election of Officers

Chairman H. T. Sands and Vice-chairman Frank R. Coates, W. H. McGrath and Edwin A. Barrows were unanimously re-elected to serve in their respective offices for another year, together with Martin J. Insull (ex officio), S. M. Kennedy, M. J. Sloan and E. C. Kifer, members-at-large.

Information Bureaus Win High Praise

Notable Addresses and Symposium of State Public Utility Information Committee Officials Are Features of Overheated Session

IN SPITE of the extreme humidity and great heat, there was a large gathering on Tuesday afternoon to discuss the work of the state public utility information committees. The program included several addresses and a symposium in which officials of many of the state committees described the individual features of their work. Enthusiastic indorsement was given to this service, which now embraces thirty states, and the influence for good which it is exerting throughout the country. In opening the meeting H. T. Sands, chairman of the Public Relations Section, recalled the fact that when the first public utility information bureaus were organized newspapers were inclined to look upon the activity with suspicion. The frank, honest and constructive manner of the committees, however, has gradually won the confidence of the press.

H. C. Abell took the chair and spoke of the necessity of making clear to the people the financial needs of a public utility corporation. The work cannot be left entirely to the committee. The utility executive must study his own company and its place in the community he serves and must continue independently to work for better public relations at home. He must also give generous assistance to his state information committee for the common good, if much is to be accomplished.

The fundamental reason why it is necessary to make this effort to inform the public of the function and purposes of the public utility was discussed at length by Don Seitz, editor of the New York *World*. The misunderstanding between the public utilities and the public, he said, dates back to an inherent characteristic of the people, an unwillingness to be influenced to the

acceptance of benefits which they do not actively desire. The central station itself was born of a desire on the part of pioneers to develop an idea of which the public was not yet conscious. Overcapitalization became a feature of early utility operation, and the industry passed through an era of consolidation and reorganization which the general public neither understood nor approved. Thanks to the great resources of the country and to the unconquerable souls of the pioneers, in spite of all these handicaps the industry has achieved its present greatness.

In years gone by, Mr. Seitz continued, men were accustomed to say, "More power to your elbow." "More power at your elbow" should be the slogan of the electrical industry. The service which the public utility offers has become a matter of such constant convenience that the public fails to appreciate how comprehensive it is. The utility therefore must preach this doctrine of universal service.

Bruce Barton, president Barton, Durstine & Osborne, stressed the need for continuous, consistent, unflagging activity along the lines of education. "Scattered throughout this country as we talk here," he said, "there are several thousand old men lying sick, and before this meeting breaks up they will have died. During this same period there will be thousands of boys and girls born into the world. The utilities of this country have invested years of effort in the education of these old men, but it must be appreciated that this investment dies with them. The same story must be told in turn to the coming generation throughout all time. The work of informing the public, the upbuilding and maintaining of an intelligent public appreciation, is never done. The story of public relations is never completely told. It must continue so that each new child will grow up in the same well-founded background of information, that he may become a more understanding customer. Emerson said, 'What you are thunders so loud that I cannot hear what you say.' It is up to every company to endeavor to develop public relations by informing the public as to its deeds and its needs. There are three good rules to follow in public information work—be genuine, be simple, be brief. Talk in the language people understand and consistently continue in the work. No one can advertise in good times and expect to live on the memory of it when hard times come."

W. W. Freeman, Cincinnati, delivered an address written by Robert Lindsay, president of the Cleveland Electric Illuminating Company, as Mr. Lindsay was unable to be present. The public information bureau, said Mr. Lindsay, is the only mechanism available for representing all four utility elements. In the final analysis of things the public holds the fate of the utility industry in its hands, but only through mutual co-operation is it possible to develop the highest type of service at the lowest rate. This co-operation can be effected only when the methods and purposes of the utilities are interpreted to the public and understood. Much misunderstanding can be overcome by simplicity of rates and regulation. Information bureaus, however, cannot accomplish this by merely stating that the service is good and that the rates are low; it must be demonstrated also by the acts of the utility, and the commission that gets only funds and no active support from its members will not go very far.

There are now at least thirty bureaus of information. Each offers a valuable approach to the public and has proved of great influence. The future of the work lies in the hands of the central-station executives, and in Mr. Lindsay's opinion the development of the public information service would shape the development of the industry.

George E. Lewis, director of the Rocky Committee, told of the work his committee has done in developing contact and co-operation with colleges and universities. Sixty lectures in all had been delivered by this committee. The entire committee met periodically with the faculty from each of the institutions in that section, and the entire evening was spent in a general discussion of methods of presentation and the attitude of the students.

Joseph B. Groce, director of the New England bureau, said that the national scope of the work is an important consideration. Many evidences have been seen that matter from the New England bulletins has been published in newspapers of the West, and much information sifts in from other sections to the New England press. Educational influence on the editors of newspapers themselves is shown more in what they don't say than what they do say and is bringing a steadily increasing understanding of utility background.

John F. Gilchrist, chairman of the Illinois committee, announced that a public utility course has been established in the Illinois University. Much good has been accomplished by the work of the speakers' bureau, and in all approximately three hundred speeches have been made. This committee recently sent out a questionnaire to bankers asking what utilities can do to establish themselves in the confidence of the people. Ninety per cent of the answers said that good service was important above all else. Another canvass was made through the clipping bureaus to show what class of article is most acceptable to the newspapers. The committee had expected that the lighter articles and short items would be most useful to the editors, but found that the greater number preferred the longer articles, technical descriptions of properties and more detailed discussions. When the work through the schools was first organized the committee was somewhat fearful that the public would resent this activity and hold it to be selfish propaganda in the interests of the utility corporations. The teachers in the schools proved extremely receptive, however, and are co-operating heartily in the work.

Earle W. Hodges, director of the Arkansas committee, described the unique publication which this bureau is issuing. It is a sixteen-page booklet "boosting" Arkansas and is very generously supported. This monthly bulletin is distributed to sixteen thousand readers in the state—editors, ministers, teachers, clubs, farmers, business men and so on. A special appeal is made to the clergy. Mr. Hodges considers the ministers, the editors and the schoolteachers the most important elements in the public audience and is obtaining active co-operation from them by frankly interpreting the work that public utilities are doing.

Commissioners Talk Frankly to Executives

Public Attitude Toward Commissions, Depends on Utility Attitude Toward the Public

THE third public relations session was notable for the symposium on public relations by five leading public service commissioners and five leading utility executives.

A large audience, including most of the executives at the convention, attended the session. Closer attention to the detail of individual customer contact, advertising and publicity backed by 100 per cent efficiency in service, introduction of the subject of utility regulation as one of the elements of courses in civil government in the grade and high schools of the country, intelligent publicity of decisions, organization of the public relations departments of utilities on the basis of the organization of engineering and financial departments—all of these were suggestions discussed.

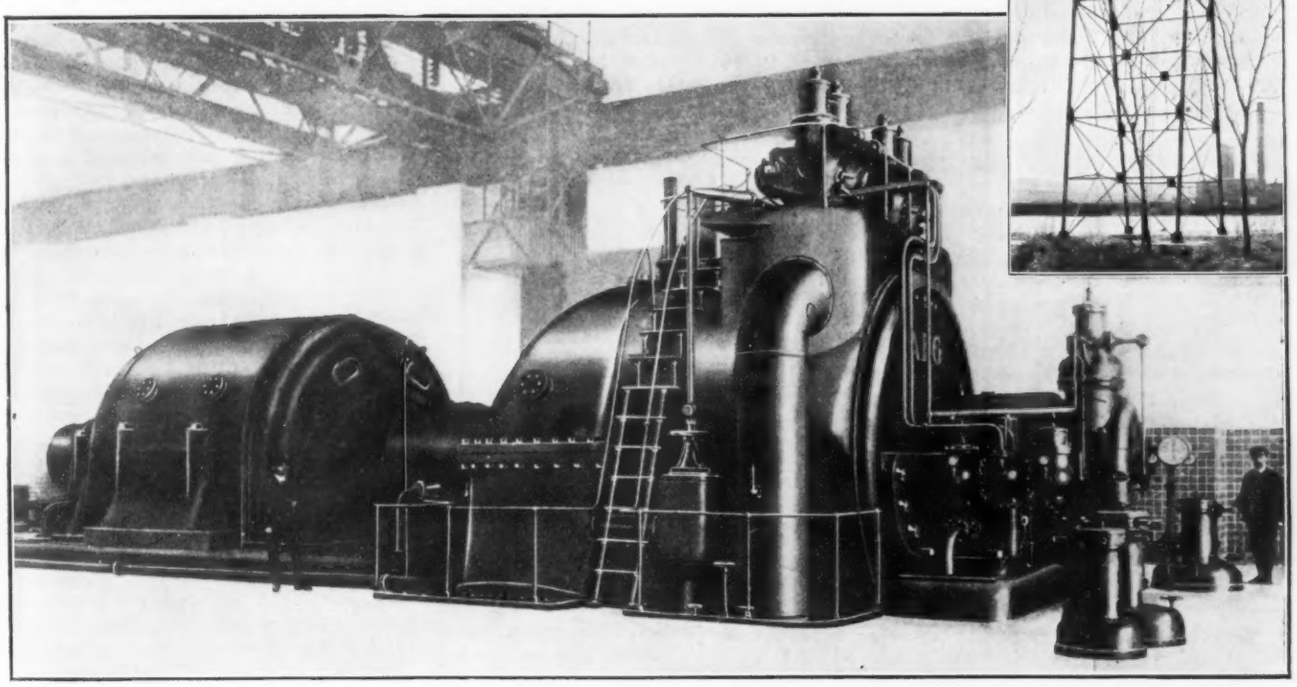
Chairman Sands pointed out that the Public Relations Section had started its career on uncharted seas, seeking advice and comments from those able to help, and that at this session men who were qualified from their positions to have a particular viewpoint of the situation were to talk.

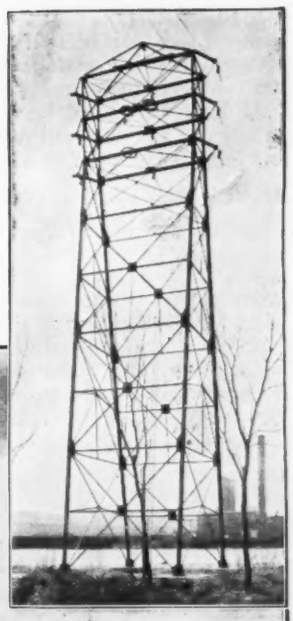
Executive Manager M. H. Aylesworth, in some introductory remarks, said that utilities used to think that service without talk was sufficient; later some thought that talk unsupported by service would accomplish satisfactory public relations; but both have been proved wrong, for both service and adequate publicity are necessary.

The individual addresses of commissioners and utility men are abstracted as a symposium which appears elsewhere in this issue.

Technical Sessions

Engineers Recognize Interlocking Responsibilities in the Solution of the Industry's Problems





THE best indication of the interest-sustaining value of the technical reports of the N. E. L. A. this year is the fact that delegates to the convention crowded one of the great ballrooms of the Commodore Hotel each session and remained throughout, despite personal discomfort due to excessive heat and humidity. The discussions were so full of meat that to characterize the technical program as a whole in a short introduction would compel the omission of reference to many subjects which deserve the consideration of every engineer. However, attention must be called to some of the "high points," such as the discussions on higher pressures, steam reheating, stage bleeding and pulverized coal, increased need of attention to obsolescence, hydraulic penstock practices, experiences with automatic operation and definition of circuit-breaker duty, substations of the future, emergency connection between non-allied companies, bulk supply to industries, standardization of overhead construction, improvements in underground cable, the plan for a national superpower scheme and progress in inductive co-ordination.

As a group of specialists, each committee presented an excellent report, but all recognized that the greatest value comes from showing the relation of important developments and practices to the industry as a whole. To serve this purpose the Technical Section inaugurated this year the practice of having authorities contribute to a symposium on some of the major subjects of interest. The symposium discussions are particularly interesting as showing some up-to-the-minute individual opinions on the matters considered.

The symposiums, as well as abstracts and discussions of all the technical reports, are printed in this section, with the exception of the reports of the committees on prime movers and electrical apparatus, which have been treated more at length, beginning on pages 1353 and 1363. The subjects are classified according to the session at which they were presented. These sessions considered respectively related subjects on generation, conversion, outside plant and utilization.

Mechanical and Electrical Innovations

Higher Pressures, Reheating of Steam, Powdered Fuel, Useful Life of Turbines, Diesel Engines, Water-Turbine Developments and Automatic Substations Are Discussed

MORE than four hundred engineers attended the opening session of the Technical Section Monday afternoon, at which the prime movers, hydraulic power, and electrical apparatus committees reported. The general discussion was preceded by addresses by engineers prominent in the industry, such as Charles H. Merz, Frederick N. Bushnell, A. G. Christie, Peter Junkersfeld and H. Birchard Taylor. The prime movers report, which is printed in considerable detail elsewhere in this issue, was presented in two sections. Emphasis was placed on recent innovations, such as higher pressures, reheating of steam, stage bleeding, useful life of turbines and internal-combustion engines.

The electrical apparatus committee report, also digested rather fully elsewhere, featured experience with automatic substations.

In opening the first technical session Monday afternoon, Chairman R. F. Schuchardt called attention to the excellent work which the various committees, as specialists, have accomplished during the year and presented as printed reports. Rather than make the convention merely the scene for a glori-

fied presentation of the reports, he pointed out, the section had this year attempted to show the relation of certain outstanding practices, tendencies and innovations to the industry as a whole by having authorities on the subjects participate in a symposium.

Hydraulic Power

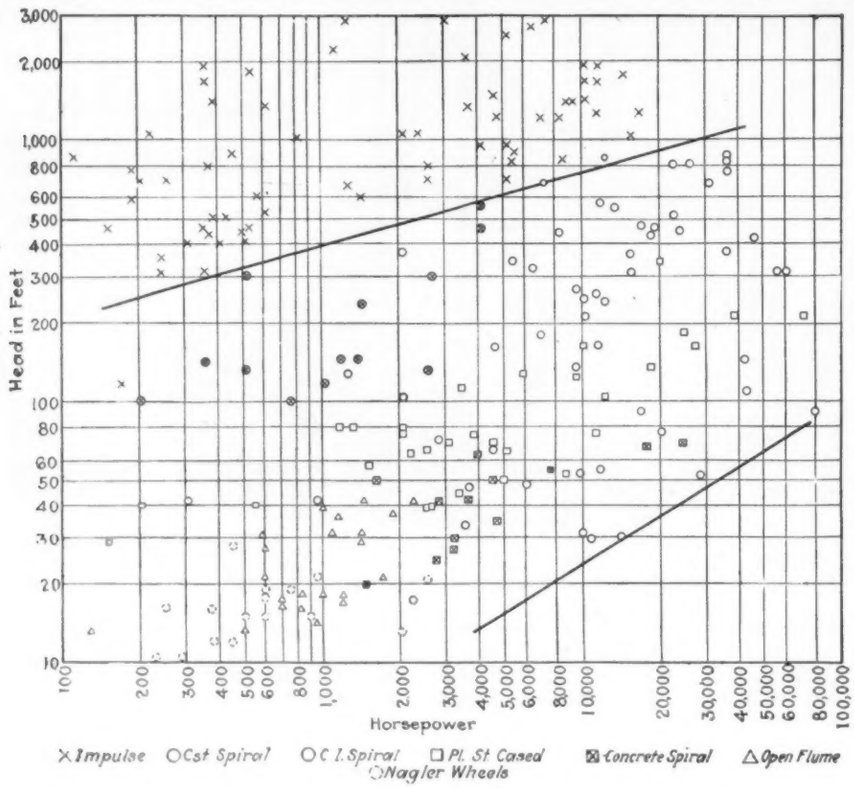
An account of the practice of various companies in the design of penstocks constituted the major portion of the hydraulic power committee's report this year. O. G. Thurlow is chairman. The subject was discussed in considerable detail, attention being devoted to the economic size, head used in determining thickness, factor of safety, minimum thickness of steel, buried as opposed to exposed pipe, coefficient of friction, air vents, expansion joints, anchor rings, anchors, piers, concrete riveted, welded and wood-stave pipe, painting, test and inspection, and specifications for steel and riveting. In addition, some space was devoted to the discussion of comparative tests on experimental draft tubes, the velocity method of measuring water flow, methods of forecasting water supply, effect of ice on water flow, and the proposed National Hydraulic Laboratory.

In general, air valves are installed on summits or at abrupt changes of grade where there is a possibility of the water column separating on a suddenly accelerating gradient, or where the hydraulic grade lines closely approach the level of the pipe line. The use of welded pipe for important penstocks is rapidly increasing. For this purpose welded pipe is practically limited to that made by a forge-welding process. Autogenous welding is not considered reliable enough for this class of work.

Reference was made to elaborate tests on twelve different types of draft tubes to determine their relative merits. Tests were made to show the effect of varying the threat openings and bell diameters, installation of supporting piers in the draft-tube bell, cones of various heights, flat plates, effect of extending horizontal diffusers down stream, effect of increasing the height of the vertical barrel, effect of enlarging the lower part of the vertical barrel, effect of decreasing areas in quarter turns to direct better the line of flow, turbine without draft tube, and other combinations. The performance of the higher efficiency tubes is almost identical. Two types of draft tubes were installed at the Mitchell Dam of the Alabama Power Company as a result of the tests shown.

Remarkable consistency of results has been noted in using the salt-velocity method for measuring water flow.

Comments from various companies on methods of forecasting water supply and observations made by several companies regarding the effect of ice on the flow of rivers were also reported. Statements of manufacturers on developments in the hydraulic field during 1922 conclude the report.



ENTIRE FIELD OF HYDRAULIC TURBINES, ILLUSTRATING PRACTICALLY ALL OF THE NOTEWORTHY PLANTS EVER BUILT

The outlying plotter points represent world records either in respect to size, extremes of head, either high or low, capacities, etc. The points above the top line represent impulse units, practically all of them being of the tangential type. The lower line represents approximately the limit of reaction units either in size or capacity for moderate and low heads, this limit being fixed by cost, shipping dimensions or generator speed. A shaded portion largely below but adjacent to the top line represents a field lying between the tangential impulse and the high-head reaction field, which is at present developed disadvantageously with these two types. It represents the field to which the proposed type of cross flow wheel is particularly adapted. Impulse wheel horsepowers are plotted for one jet.

Adoption of Innovations Demands Reconsideration of All Factors

Charles H. Merz, consulting engineer, London, England, and member of the firm of Merz & McClellan, which designed the North Tees station in England, addressed the Technical Section Monday afternoon on the conditions which led up to the design of that station and the results of experience in its operation. This station was constructed in 1917 and embodied many of the innovations which have been adopted in this country recently, such as high pressure, air preheaters, stage bleeding and interstage heating. The adoption of so many innovations, Mr. Merz pointed out, demands that all factors entering into plant design be reconsidered seriously. Heat that can be taken back to the boilers instead of to the condensers should be transported there to secure the greatest economy. Since stage bleeding furnished all the heat necessary for raising the temperature of feed water, it was impossible to use economizers. Hence to save the heat in the flue gases air preheaters were employed to deliver air under the chain-grate stokers. Strange to say, Mr. Merz declared, no trouble has been experienced with this practice. The air preheaters have given less trouble than economizers and are cheaper to construct and maintain. No trouble has been experienced with stage bleeding, but the last heater next to the boiler had to be designed for boiler pressure, namely, 500 lb. Employing interstage heating has involved no problem except taking the steam back to the boiler and there superheating it to operate a 100-lb. pressure turbine. Some trouble has been experienced with the high-pressure cylinders of the prime movers, but this was due to the use of materials which would not have been employed at any time except during the war.

Commenting on the American tendency in driving auxiliaries, Mr. Merz declared that he did not believe it advisable to use house turbo-generators with high pressures. What is the necessity of striving for the last fraction of a per cent in economy in prime movers, Mr. Merz asked if the house turbines are used which offset the saving? If auxiliaries cannot be operated reliably by electricity derived from the station busbars, they can be driven from direct-connected auxiliary generators. The only place for the house turbine, Mr. Merz contended, is where an internal-combustion engine having an economy equal to the prime mover can be employed to drive it. This is one service where the internal combustion engine may possibly be used in large stations to advantage, he declared.

Sets Goal of One Kilowatt-Hour per Pound of Coal

Development in the art of steam-power production has progressed far enough to make it entirely feasible to attain a goal of one kilowatt-hour per pound of coal in the near future, according to Fred N. Bushnell, Stone & Webster, who made an address on "Higher Steam Pressures and Improvement in Station Economy." One means of attaining this mark is through the use of much higher steam pressures. Materials and methods available at the present time will permit the use of two or three times the customary steam pressures, but higher temperatures must await development in metallurgy. The obvious method of preventing too early saturation is to restore the temperature of the steam by passing it through a reheater at an intermediate point in its expansion.

Already there are a variety of arrangements for utilizing higher pressure in conjunction with the reheating cycle. There is the single turbine arranged for extraction and return of the reheated steam, the tandem arrangement with high-pressure and low-pressure turbines driving the same generator, and the cross-compound arrangement of two or more distinct units which may be either adjacent or widely separated. Problems of design seem to demand that the pressure for the single reheating unit be limited to 500 lb. or 600 lb. For higher pressures one or the other two arrangements is probably to be preferred. The efficiency of the cycle demands that the reheating be accomplished with the lowest possible loss of pressure; this has an important bearing upon the arrangement selected. Control of the temperature of the reheated steam must likewise be carefully provided, especially where a varying load is to be carried.

In one arrangement promising reasonable flexibility as well as the highest efficiency a relatively small and simple high-pressure turbine will, for each individual boiler, reduce the pressure of the steam from 1,200 lb. to 375 lb. and deliver it through a reheater, in the same boiler setting, to a main header supplying turbines of the present standard type.

Already steam pressures up to 1,200 lb. have been definitely planned for commercial installation. For an experimental plant in England a critical pressure of 3,200 lb. will be adopted. Mr. Bushnell expresses confidence in the soundness of seeking greater economy through the use of higher pressures. Boiler and turbine builders, he explained, do not question their ability to produce reliable equipment for generating and utilizing steam up to at least 1,200 lb.

In order to be economically warranted, however, any station improvement must show an operating saving greater than the increase in carrying charges. The total cost of a high-pressure station, Mr. Bushnell announces, promises to be comparable with that of a station of equal generating capacity using the lower pressures now considered standard. The anticipated saving in operation should therefore be practically a net saving.

R. F. SCHUCHARDT
Retiring Chairman

H. P. LIVERSIDGE
Incoming Chairman

Obsolescence Demands More Attention than Ever

On account of the almost unprecedented adoption of new practices in the central-station field, some of which are almost radical in the absence of extensive experimental data, and the fact that the use factor of equipment now being adopted is indefinite, there is more necessity than ever of giving serious consideration to obsolescence in determining the economies of new innovations, asserted Peter Junkersfeld in an address before the Technical Section. Furthermore, the prospective capacity factor or usefulness of the unit must be carefully estimated. Mr. Junkersfeld made the following observations:

According to an analysis of eight companies having 113 turbines with a total rating of 2,250,000 kw., nine turbines one year old had a generating-capacity factor of 45.2 per cent, twenty-one turbines two years old had a factor of 50 per cent, eighteen turbines three years old had a factor of 49.5 per cent, seven turbines six years old had a factor of 39.5 per cent, and sixteen turbines ten years old had a factor of 25.6 per cent.

In general savings and loss balance must be established. The balance should include operating and maintenance labor, supplies and adequate fixed return on investment. Coal savings will vary with the cost of coal being used and the yearly load factor at which the equipment is operated each year during its life. In determining the savings the life assumed should be the same as the life used in determining fixed charges on the loss side of the balance.

The fuel savings must obviously be placed on a kilowatt-hour basis. To have a true balance the extra fixed charges should also be placed on a similar kilowatt-hour basis.

A Frank Appraisal of Powdered Fuel Presented

Prof. A. G. Christie, Johns Hopkins University, made a very frank appraisal of powdered fuel in an address before the Technical Section Monday afternoon. In general, he said that while powdered fuel has many points in its favor, there is a great danger in the extensive adoption of an underdeveloped practice by enthusiasts. The decision on whether to use powdered fuel depends entirely upon each individual installation.

Among the advantages cited for powdered fuel were the following: With this system low-grade fuel may be burned economically which could not be so burned in stokers. Furthermore, it permits of change from one type of fuel to another with very few modifications. Changes in load are easy to handle and standby losses are small as the coal supply can be shut off when the load drops. On account of the ability to minimize the excess air supply, it is possible to obtain higher efficiency, 80 per cent and greater efficiencies being possible of attainment above and below 200 per cent rating. Besides, the carbon losses are much lower than in stoker-fired boilers.

On the other hand, powdered-coal burning requires a higher grade furnace attendant than stokers. Very careful control of coal and air supply is also essential. Power requirements for pulverizing and transporting fuels are relatively large and there are still opportunities for improvements in pulverizing equipment. While water screens can be used to remove ash from powdered-fuel installations, it is very difficult to remove floating material in chimneys. In fact, removal of ashes may cost more than the removal of clinkers in stoker-fired plants.

Before there is a general adoption of powdered fuel, there is a great necessity to have power station records to analyze. Furthermore, there is an opportunity for considerable improvement in equipment. None the less, Prof. Christie commended manufacturers for the great strides they have made so far.

American and European Hydraulic Turbine Practice

"There is no question that so far as mere magnitude of individual installations and number of installations are concerned American engineers have been pre-eminent" in hydraulic turbine practice, declared H. Birchard Taylor, of the William Cramp & Sons Ship and Engine Building Company, in his address. However, the advancement of the art may more justly be based upon the development of the creative ideas which have been produced.

"On this basis," Mr. Taylor continued, "the art of turbine design has reached a higher state of evolution in America

than in Europe. In this country the practice has been firmly established of putting every new development to the test. Since turbine construction is not a mere matter of furnishing material and labor, expenditures for experimental work are essential to the ultimate success of the industry."

The almost general adoption of vertical-type waterwheels and high-speed propeller-type runners and the development of the draft tube were cited by Mr. Taylor as three outstanding achievements of American engineers. "According to Holyoke tests on a diagonal propeller-type turbine having a specific speed of 680 or 153 (foot-pound system) an efficiency of 88.7 per cent was obtained, the turbine being equipped with the spreading type of draft of tube. The same turbine with a runner of somewhat lower specific speed, namely 497 (metric) or 112 (foot-pound), gave an efficiency of 90.7 per cent. In the still higher specific speed field an efficiency of 85.5 was obtained at 800 specific speed (metric)."

Commenting on some fallacious impressions which prevail regarding waterwheels, Mr. Taylor said: "Any type of reaction turbine — Francis, propeller or other type—obeys the laws of hydraulic similarity, namely, that their powers vary as the three-halves power of the head if the speed is allowed to vary as the square root of the head, provided that the turbine is located correctly with respect to tailwater. In the case of any type of reaction turbine which is placed too high with respect to the tailwater so that the continuity of flow through the turbine as a whole or in part is destroyed, the power will not vary in accordance with the above laws.

Auxiliary Drives and Higher Temperatures Arouse Comment

In the selection of auxiliary drives, declared R. A. Hentz, Philadelphia Electric Company, reliability of operation is of the utmost importance. In attaining this requirement continuity of energy supply and control are important. After an interruption of service the equipment must return to normal operation. This is easy with induction motors, but may not be so with synchronous motors, he said.

In reply to this comment, F. C. Hanker, Westinghouse Electric & Manufacturing Company, contended that there are some places where synchronous motors are very satisfactory, and, besides, the psychological effect on consumers is desirable as a means of improving power factor. There are designs on the market which have a starting torque equal to the full-load torque. The speaker also referred to the use of a house generator driven by a simple turbine which normally floats on a line but drives the generator in an emergency. However, he warned that engineers must be careful not to adopt any equipment which will jeopardize reliability.

V. T. Malcolm, Springfield, Mass., referred to stability tests of metals at high pressures and high temperatures, saying that several oil refineries have pipe lines operating at 600 lb. and 900 deg. F. and even 1,200 lb. and 1,000 deg. Results of exhaustive tests at 1,000 deg. were cited in which an elastic limit of 21,000 lb. was obtained and a tensile strength of 52,000 lb. with 53 per cent reduction in cross-section and 29 per cent in elongation. At 800 deg. F. the characteristics of steel changes rapidly.

The stress due to high temperature is usually the one which is not sufficiently taken into account, declared Peter Junggren, General Electric Company. Expansion which takes place at high temperatures requires refinements not considered heretofore. Furthermore, most valves are designed incorrectly and produce unnecessary losses, which must be avoided at higher pressures and temperatures. They must be designed for freedom of expansion. Manufacturers expect no trouble in designing turbines for 1,200 lb. to 1,500 lb. pressure, he asserted.

Straight single-cylinder turbines have been adopted as standard for 600 lb. pressure by the Westinghouse Electric & Manufacturing Company, declared Frank Hodgkinson of that company. For higher pressure low-pressure elements will be compounded with such units. While reheating adds to the efficiency of operation at high pressure, it can be dispensed with if the turbines are designed for disposing of moisture and for bleeding steam for feed-water heating. However, this involves a problem of control to bypass reheaters, thereby injecting complications which might be undesirable.

National Superpower Network Proposed

Place of High-Voltage Cable in Such a System—Forty-four Standards for Overhead Construction—Analysis of Cable Failures —Motor Rules and Service Voltages

F. G. BAUM'S scheme for a national superpower network was the outstanding feature of the third technical session. The place which high-voltage cable will play in superpower schemes was touched on by W. S. Murray. In the reports of the overhead and underground systems the most important features were the overhead standards proposed and the analysis of cable failures. Sub-committee reports of the electrical apparatus committee (abstracted quite fully elsewhere) dealt with motor rules, transformer standards, radio and service voltages.

Mr. Baum's plan,* which is most ambitious in its scope, contemplates the establishment of 220,000-volt trunk lines between the major water-power and fuel-power centers of the United States and the most immediate markets for energy, including industries, mines and quarries and railroads. His proposal is based on four years' study of conditions as they are and of power requirements as he sees them in the immediate future as well as at a more distant time. Prior to presenting his plan, Mr. Baum outlined very generally but comprehensively the nature of studies which led up to his conclusion. These were explained by a series of graphs, charts and maps, giving results of surveys covering the following subjects: Existing systems and capacities, existing and prospective loads, diversity of customer, system and regional loads, as well as stream characteristics, distribution of fuel and water-power resources, etc. He arrived at the proper relation between steam and water-power plant capacities and pointed out that at the present rate of the growth of the industry the equivalent of one modern superpower plant will be required every thirty days. Attention was called to the fact that the Columbia River in the Northwest offers one of the most valuable sources of power in the whole United States.

For the near future Mr. Baum believed that his plan was most feasible of execution in the Northeast; California, the Southeastern section of the United States, as well as the Middle West, have already started the nucleus of this superpower scheme. Later it may be possible to give the prairie states from Canada to the Gulf the benefits of power which they do not have now. Speculating on the future, he said that if power can be generated on the Columbia River for 0.3 cent per kilowatt-hour and 150,000-kw., 220,000-volt lines can be built for $40,000 per mile, energy could be delivered 600 miles from the generating point at about 0.8 cent per kilowatt-hour.

Importance of High-Voltage Cable in Superpower Scheme

"The underground-cable structure is no less a part of a superpower scheme than the 110,000/220,000-volt overhead lines," declared W. S. Murray in an address before the Technical Section. "To realize the future rôle the high-voltage electric cables are to play one has but to look at the rapidly forming necessity of conducting large quantities of electric power beneath the earth's surface. Our overhead day within our cities and on the approaches to them is drawing to a rapid close. Henceforth what we shall need is not only 33,000-volt but 66,000-volt cables."

W. S. Murray expressed the firm belief that the policy of the public utilities is going to change rapidly and that eventually generating companies and distribution companies will be corporately distinct although possibly financially connected, as such separation will enable the distribution companies

*A more detailed account of this plan appeared in the Electrical World for June 2, 1923.

to utilize money now spent for generation in extending the usefulness of electric service. He also referred to the important place which high-voltage cable will play in transmitting superpower into and within large cities, where the overhead line is fast becoming a thing of the past.

Underground Systems

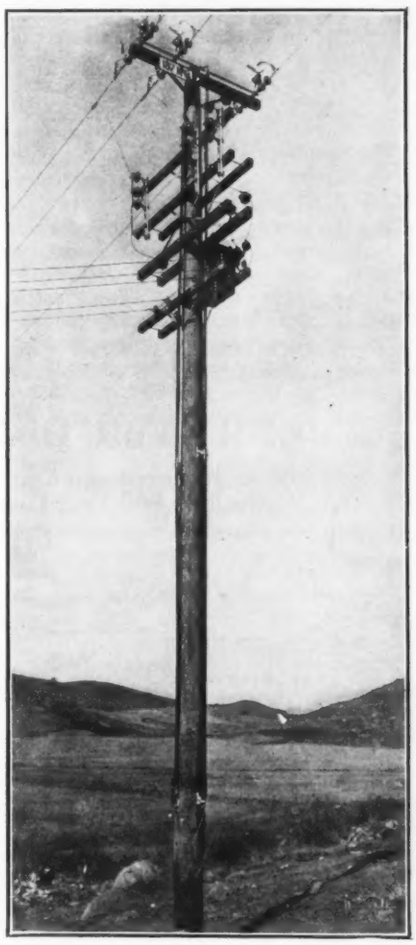
Two developments of great interest and importance to the central-station industry were apparent in the report of the underground systems committee, G. G. Post, chairman. First improvement in the quality of paper-insulated, lead-covered cables has made it possible to reduce the thickness of insulation without reducing the factor of safety of operation; second, the use of the kenotron for testing high-voltage cables with direct current promises to result in the ability to detect incipient failures of cables so that weak spots may be removed and the troubles due to cable failures largely eliminated. The insulation now used with Edison system cables ranges from $\frac{4}{64}$ in. on the smaller sizes to $\frac{6}{64}$ in. on the larger, such as 2,000,000 circ.mil. Cable rated at 12 kv., which in 1920 had insulation of approximately $\frac{13}{64}$ in. plus $\frac{6}{64}$ in., which since that time has been steadily reduced so that it now requires only $\frac{9}{64}$ in plus $\frac{4}{64}$ in., exceeds the voltage requirements in the breakdown tests on samples, with about the same margin of safety as formerly. Today the test requirements are easily exceeded. The recent factory breakdown tests between conductors have gone as high as 195 kv. and 174 kv. in the first and second tests respectively, without insulation failure, and up to about 115 kv. between conductor and sheath in both tests.

The power factor of the charging current at 80 deg. C. in the 12-kv. cable decreased from about 15 per cent to 3 per cent and recently has been as low as 1.4 per cent. The 33-kv. cable works at about 70 per cent higher dielectric stress and is more affected by the extra "ionization" loss. Its power factor at 80 deg. C. has dropped from values as high as 9 per cent in 1921 until now all manufacturers practically are furnishing cable under 4 per cent and as low as 2 per cent.

During the year 1922 one company was able by means of the kenotron almost to eliminate failures in service on a number of 6,600-volt rosin-oil cables. In making kenotron tests it is recommended by the committee that the direct-current voltage as determined by the voltmeter readings shall be two and four-tenths times the corresponding alternating-current voltage as given in the specifications.

During the past year one company has placed in successful operation about 30 miles of 350,000-circ.mil, three-conductor, 33-kv. cable, and it contemplates making further increases in this working potential on future lines. Another company is now installing some 500,000-circ.mil, three-conductor cable for operation on 44-kv., three-phase circuits. Several other companies are making investigations into the feasibility of securing single-conductor cable for operation on 66-kv., three-phase circuits. The chief limitation seems to be in the amount of ionization.

According to tests made on the Hochstadter-type cable, it seems reasonably clear that local charring due to tangential stresses between conductors does not take place to any marked degree in low-loss cables, although it probably is an important factor in high-loss cables. Hence the improvement in dielectric loss characteristic of recent cables makes this advantage of the Hochstadter-type cable of little value.



SWITCHING AND TRANSFORMING EQUIPMENT FOR RURAL SERVICE

ANALYSIS OF CABLE AND JOINT FAILURES

Reports covering cable failures during 1922 were received from twenty-four companies operating cable systems which range from 6,600 volts to 33,000 volts, 13,000 volts being most extensively used. During the period covered there were 506 cable failures and 150 joint failures on systems aggregating 5,543 miles of cable. Hence the combined failures represent 11.8 failures per 100 miles of cable installed. The corresponding figure for 1921 was 14.1 and for the past five years it was 11.7. Considering the joint failures only, there were 2.7 per 100 miles, or 34 per cent lower than for 1921, despite a 16.5 per cent increase in cable mileage. During 1922 only 1.35 joints out of every 1,000 failed, while in 1921 there were 3.9 failures out of every 1,000 joints made. The majority of failures were attributed to factors external to the cable.

Classified according to voltage, there were 9.5 cable failures and 2.4 joint failures per 100 miles of cable operating at 6,600 volts and 15,000 volts, whereas with 20,000-volt to 33,000-volt systems there were 6.4 cable and 5.5 joint failures per 100 miles. The inference is that improvements in making joints, especially on the higher-voltage cables, has not kept pace with the improvements in the insulation of the cable itself.

There is a noticeable tendency toward the use of alternating current for underground distribution in large cities in connection with more recent installations. To secure the same continuity of service as in older direct-current systems, one company has started equipping its alternating-current substations with automatic selective protection. The distribution transformers on this system are connected in parallel on the secondary side with alternate transformers connected to different feeders on the primary side. At the point where transformers are connected to the secondary distributing mains a special automatic network switch is installed which operates to open the circuit on the reversal of energy flow equal to or greater than the core loss of the transformer. This switch also automatically recloses on resumption of normal voltage and power-flow conditions.

As a result of tests on heat radiation from conduits, it is now the practice of one company, where practicable, to install conduits not closer than 15 ft. apart and to limit the number of ducts installed to a maximum of eight, arranged two wide and four high, so that each conduit has at least one side adjacent to the surrounding earth. To minimize the temperature of its duct lines another company makes its ducts in the form of a U with a 4-in. drain pile located in the middle.

Overhead Systems

Standardization and investigation of new and improved practices constituted the features of this year's report of the overhead systems committee (L. M. Klauber, chairman). Of the forty-four specifications for construction materials which were submitted and approved by the association as tentative standards last year, the committee this year presented thirty-eight for final approval. They covered guy clamps, clevises, side-groove and top-groove porcelain pin-type insulators, large and small porcelain spool insulators and side-groove, top-groove and service-glass-pin-type insulators.

Thus far the Western Red Cedar Association has refused to adopt the

proposed specifications for western red-cedar poles. This year the committee presented for tentative approval a new specification for chestnut poles. Several interesting modifications and innovations for timber preservation were submitted, and field practices of one company in pole inspection were described in detail. Some interesting notes were given on protection against termites, which continue to be great pests in the destruction of poles in some sections of the country.

Companies which use care in the selection of insulators based on climatic and physical conditions of the territory traversed will have few, if any, difficulties with the products now available in the market, the committee declared. There is still evident a tendency to charge insulators with failures which are in reality due to faulty pin design or utilization. Too rigid a type of conductor support is also to be avoided, as difficulties may be caused either by the breaking of the insulator top or by crystallization and ultimate failure of the conductor itself.

The sub-committee on insulator research continued its study on the effects of cyclic temperature changes on insulator life. A novel method of test to destruction, devised by A. Herz, was related.

A summary of some new and improved devices now available for line sectionalizing and protection was presented. Practices of several companies were related with reference to the position of transformers on poles and the sizes and weights which are hung on single poles. Attention was paid to labor-saving devices, automotive equipment, tools, etc., owing to the fact that companies are extensively adopting special mechanical equipment, such as pole-hole digging and pole-setting machines, air drills and concrete breakers, hoists and shaving machines.

A final report on the construction of the 220,000-volt lines in California was presented.

Two specifications for wood-pole transmission lines were included as indicating the practice of two large companies. The committee insisted, however, that it did not in any way wish to advocate their adoption as standards.

The use of high-voltage distribution lines is now on the increase. Not only is the rural and suburban field being covered by such circuits (as has been the practice for many years in the past), but thickly built-up districts as well.

Rural-line construction received considerable attention. Where such construction is utilized with due regard to local climatic conditions and the increased strength of structures which long-span construction involves a considerable reduction in first cost is often possible. Note was taken of the increased use of pole-type constant-current transformers and mast-arm construction for street lighting rather than span suspension.

Differences of Opinion Expressed

Certain recommendations and conclusions of the overhead, underground and electrical apparatus committees aroused adverse comment.

R. W. Atkinson disagreed with the conclusions of the underground systems committee regarding the value of the Hochstadter cable. He claimed that this cable shows its greatest advantages with improved types of insulation, since it is particularly intended to relieve the tangential stresses in the filler between conductors. He contended that the committee reached a different conclusion because tests were made with cables which apparently had old-type conductor insulation.

W. A. Del Mar urged caution in following the committee's recommendation of 2.4 times the alternating-current voltage value when direct current is used for cable testing. The factor should be more nearly 1.4, he claimed, where the impregnating compound is very fluid, as in new-type cables, or where the paper insulation is very loose, as in old cables. The speaker also questioned whether rise of power factor is necessarily an indication of air ionization. The opinion was expressed that the committee assumed too much in stating that air ionization is a serious limitation to cable operation at the higher voltages.

In discussing the reports of the subcommittee of the electrical apparatus committee on motor rules and service voltages (abstracted elsewhere), L. L. Elden, Boston, expressed extreme disappointment over the inclusion of increased starting currents and of running currents. Regarding three-phase as opposed to single-phase transformers, he said that the selection depends on individual circumstances, but appeared to favor the three-phase transformer. Temperature indicators were commended most highly as a means of reducing the investment in transformers, eliminating testing and increasing load factors. The comments were based on actual experience in Boston.

250/500-Volt Distribution Proposed

Stone Believes Its Increased Capacity and Saving Warrant Study—Dow Outlines 4,600-Volt Distribution to Power Consumers—Torchio Suggests Principles of Interconnection

THAT central-station engineers give serious attention to the use of three-wire, 250-500 volt distribution systems to replace the present nominal 110-220-volt practice was the recommendation of C. W. Stone, manager of the lighting department of the General Electric Company, in his address on "The Future Substation," in the symposium on substations, before the second technical session on Tuesday. Mr. Stone's address followed Mr. Tapscott's presentation of the substation and oil-circuit-breaker section of the electrical apparatus committee's reports, which appears elsewhere in this issue.

Mr. Stone said that, although developments had probably fixed a nominal voltage of 125 as a distribution practice, this service could be furnished efficiently and economically on alternating-current systems by the use of 250-125-volt auto-transformers and on direct-current systems by balancer sets. On a direct-current system serving 12,000 kw. per square mile and producing 46,000,000 kw.-hr. annually with sixty-four 1,000,000-circ.mil feeders, he said that approximately 560 tons of copper is required in feeders with 56 tons in the neutral and 140 tons in the network. Using a 250/500-volt, three-wire system, he said, 280 tons of copper could be saved. To supply 125-volt service sixty-four balancer sets of 100-amp. capacity would be needed at the feeder taps, costing approximately 10 per cent of the cost of the extra copper in the lower-voltage system. He was confident that the industry possesses the brains to make the 250/500-volt system work as it has in foreign countries and that the saving will make the effort worth while.

Indulging in what he characterized as dreaming on the subject of the vacuum tube and direct-current transmission, Mr. Stone said that all of the conversion operations from alternating current of varying voltages and frequencies to direct current and back again have been accomplished and that the elements of the necessary tubes are now in use. If the tubes are finally developed for practical service, he said that it means a revolution in high-voltage transmission practices. Existing lines could be used at three to four times present capacity.

The synchronous condenser would disappear from the substation, though it might become a necessary part of the generating station. The tubes required to transform from alternating current to direct current may be different from those for the reverse process, Mr. Stone said. For the low-voltage direct-current systems the substation might disappear and numerous feeding points from low-current tubes be substituted, since there is no present indication that tubes of ampere capacities running into the thousands will be developed.

L. L. Elden characterized C. W. Stone's advocacy of 250/500-volt distribution as a very disturbing suggestion now that operating companies have practically approached a standard, saying that the change-over would be almost prohibitive from an expense viewpoint. Furthermore, he declared that it is questionable whether the loss in distribution systems is as much as Mr. Stone cited, since 80 to 85 per cent of the input to substations is metered at the customers' premises. However, he advocated careful consideration of Mr. Stone's suggestions.

Alex Dow, president of the Detroit Edison Company, outlined the method of furnishing service to large power consumers from the 4,600-volt system in Detroit. This system has during a twelve-months period furnished an average of 210 consumers with 43,000,000 kw.-hr. in a single month and with 442,000,000 kw.-hr. for the year. A low limit of 100 kw. capacity for service from these circuits has been established because experience has shown that consumers using less capacity than this do not employ help capable of handling the higher voltages safely. Customers own their transformers and other service equipment except meters. A similar service is furnished from the direct-current system with a minimum of 300 kw. capacity, which is soon to be lowered to 200 kw. The higher limit is due to the greater cost of the cable and other equipment for the service under the Hopkinson form of rate used for both alternating-current and direct-current service.

Mr. Dow said that radial feeders with plain overload relays are used on the 4,600-volt system and loop feeders with balanced relays on the direct-current system. The 4,600-volt system is "plus" regulated only and therefore is not commendable from the standpoint of general service, and the responsibility for regulation is a burden of the consumer. In handling the 4,600-volt system, Mr. Dow said, the problem of contacts with trees is the most serious difficulty, and the 2,200-volt service still existing in some sections of the city can only be changed over as the standard of construction is raised and the difficulty mentioned is overcome.

Emergency Connections Between Non-Allied Companies

Philip Torchio gave as the first principle of emergency connections between non-allied companies the utilization of all existing facilities to insure continuity of power supply to the public, economies in investment and operation and saving of coal. The second principle is that the fixed and operating charges of the tie lines should be equitably divided among the contracting parties in proportion to the benefits derived. The third and last principle is that no company should derive a profit at the expense of another company, but only from the investment and operating savings due to the interconnection. Mr. Torchio cited a number of contact provisions which are designed to carry these three principles into effect.

Safety Rules

Chairman Sproule in submitting the final report of the safety rules committee and recommending that it be disbanded, as its work has been accomplished, recommended that each technical committee be instructed to appoint a subcommittee on safety rules and that all safety codes be cleared through the engineering staff at N. E. L. A. headquarters, which will refer such codes to the committee concerned, with the understanding that a sub-committee will review the work and refer it back to the engineering staff with such suggestions for revision as are thought necessary. Mr. Sproule reported the organization of the sectional committee for revision of the National Electrical Safety Code under the American Engineering Standards Committee procedure which is composed of representatives from about twenty-five national associations. An executive committee of seven representatives from the insurance interests, employees, steam railroads, electric railway, utility commissions, municipal inspection interests, electric light and power and telegraph and telephone interests has been formed and sub-committees to consider the relative hazards of circuits in different situations, clearances, strength of materials and underground construction have been organized to carry on the work of revising the safety code.

Meter Committee

The section on maintenance of relays prepared by the Metropolitan Section of the N. E. L. A. for the relay handbook was a feature of this year's report of the meter committee, with W. L. Wadsworth as chairman. Action on standardization of meter instrument design, a compilation of public utility commission rules on frequency of meter tests, company practice on limitation of two-wire meters and the regular résumé of manufacturers' developments concluded the report.

In addition to presenting various forms of records used in relay maintenance work, the report covered acceptance, installation and periodic tests, equipment in making tests, typical procedure for testing various types of relays and usual troubles with relay maintenance.

The committee has for several years encouraged technical universities and colleges to conduct short courses for metermen of their localities. Where the suggestion has been followed much good has been done.

Efforts have been made to eliminate certain special requirements specified by users of meters and instruments, but little progress has been made. The committee urged manufacturers of meter cabinets and wiring devices to provide such devices as will accommodate the meters with which they will be installed.

It was the committee's opinion that no change in register ratios and constants should be allowed. Neither should any terminal change that will not meet the specifications of the Association of Edison Illuminating Companies be allowed. To convert top-connected meters to bottom-connected meters it was recommended that the necessary parts be obtained from the meter manufacturer rather than by using some auxiliary wiring device. It was reported that manufacturers are of the opinion that the present rotating standards are not subject to temperature errors which cannot be compensated for by proper use.

In the redesign of existing types of instrument transformers a majority of the manufacturers have complied with the recommendations of the committee relative to the standardization of dimensions, polarity and polarity marking. Testing of such transformers on customers' premises has been a problem which is now solved to a considerable extent by the introduction of Silsbee current and voltage transformer test sets. The manufacturer's statement as to accuracy is fully justified, the committee reported.

Synchronous timing motors are being used generally, although the new type is gradually displacing the old. According to a questionnaire the 10-amp., 110-volt, two-wire meters are being used in preference to 5-amp., 220-volt, three-wire meters.

Meterman Education

Prof. Frank D. Paine, professor of electrical engineering, Iowa State College, in the symposium on metering, defined a properly qualified meterman as one who understands the fundamentals of electricity, the meter and how it functions and the fundamentals of meter design, who can think and take an interest in his work, who understands the relations of metering to demand and rates, and above all the relationship between the public and the utility he works for. Men selected for meter work should be capable of education to fill these specifications, and Professor Paine said that the utility companies must move first by raising the standard and pay for the work. To carry out better education of metermen he suggested more trade school courses of one or two years of which meter work shall be the primary part. He said that from twelve to fifteen hundred electrical engineers are being graduated this spring, of whom only a small number are entering the utility field, and that an opportunity is offered to bring many of these men into meter work, using this occupation as a stepping stone to a better position in the utility organization. In conclusion, Professor Paine outlined the work on five short meter courses held in the past five years at Iowa State College.

Frank G. Vaughn, sales manager meter department, General Electric Company, urged the same care in equipping and maintaining meter departments that is exercised in other departments of the business.

Liversidge New Technical Section Chairman

Officers of the Technical Section for the administrative year from July 1, 1923, to June 30, 1924, were elected at the Tuesday afternoon session. They are: Chairman, H. P. Liversidge, Philadelphia Electric Company; first vice-chairman, L. M. Klauber, San Diego Consolidated Gas & Electric Company; second vice-chairman, C. F. Hirshfeld, Detroit Edison Company; third vice-chairman, W. K. Vanderpoel, Public Service Electric Company, Newark, N. J.

Inductive Co-ordination in Good Shape

K. L. Wilkinson and H. B. Gear Review Year's Progress—Hypothetical Cases of Co-ordination Are Discussed and Questions Answered

CALLING the attention of the fourth technical session on Thursday afternoon to the main principles involved in the work on inductive co-ordination, K. L. Wilkinson, engineer for foreign wire relations of the American Telephone & Telegraph Company, summed up the year's progress by saying that the status of the work is better today than it has ever been before. He attributed this result to the splendid support of the joint general committee by the N. E. L. A. member companies and the Associated Bell Companies. He further said that the previous estimates of the large growth and development of both the supply and signal utilities are being realized, if not exceeded, and the future work on co-ordination will require the most careful and intelligent study to insure that the public shall receive satisfactory and efficient service of both kinds. His conclusion was that the progress during the past year has shown that the fullest co-operation and interchange of information and data between representatives of the two utilities form the basis for successful co-ordination. It has also proved the desirability and necessity for the continuation and extension of this work.

H. B. Gear of the Commonwealth Edison Company, speaking on the same subject contrasted the present status with that of two or three years ago and characterized the progress by citing the recognition that has taken place that three parties are equally interested, the public, the power companies and the signal companies. He also brought out the recognition of inductive influence, inductive susceptibility and coupling as factors in the problem as an evidence of the progress made. Mr. Gear reviewed the progress of the geographic division inductive co-ordination committees and expressed the opinion that the difficult problems experienced in the early days of the national committee work in keeping in touch with field conditions and in spreading the information developed through its work are being solved by the division organizations and their work.

Inductive Co-ordination

Establishment of co-operative procedure between the Bell Telephone System and the N. E. L. A. was one of the chief accomplishments of the year, according to the inductive co-ordination committee (R. N. Conwell, chairman). It resulted in the adoption on Dec. 9, 1922, of joint "principles and practices," which were given in full in the report this year. Continued organization and expansion of the activities of the geographic division and local committees on inductive co-ordination were other prominent results of the year's work. These committees practically constitute a field force or staff for service to member companies and have rendered most valuable assistance in carrying the "principles and practices" to member companies and also in collecting important field data and surveys for the national committee and headquarters staff.

Owing to the lack of exact technical data and insufficient knowledge of inductive phenomena, it was necessary to limit the "principles and practices" very largely to qualitative statements and provisions, which will be supplemented in the future by more exact detailed practices as the knowledge of the art is progressively advanced by the joint development and research program now organized by the Bell companies and the N. E. L. A.

In its broader aspects the national work on this problem is emerging from its exploration or pioneer period and entering its constructive stage. The future program recommended by the committee embraces continuation of the general study of the physical, economic and legal aspects of the problem; continuation of the educational and co-operative work with member companies, through the division and state committees and headquarters staff; co-operation with the joint committee on development and research, and general continuance of the division committee activities in making field surveys and tests and assisting member companies.

The committee urged particularly that executives, officials and engineers of electric service companies read this report in full because it contains material which can be made of immediate permanent value in procuring satisfactory handling of current problems of inductive co-ordination through co-operative procedure between the local interests directly concerned. The report contains detailed preferred practices, so that a basic code is now available for guidance in the co-operative settlement of specific cases. Difficulties which may arise in applying the "principles and practices," owing to unusually severe local conditions or to meeting inductive phenomena not as yet subject to full control or mitigation, or from any other cause, can be made to serve a very useful purpose in guiding the course of the research work.

Hypothetical Cases Solved

As the final part of the program two hypothetical cases in inductive co-ordination were presented. The first, discussed by J. G. Hemstreet, superintendent of operation, Consumers' Power Company, Jackson, Mich., was that of the building of a power line between two points. Two routes were available, one being direct and resulting in a cost to the telephone company of three or four thousand dollars for retransposing, and the other route, which was a longer one, resulting in a cost of $30,000 to the power company. Either route involved difficulties to one or the other utility. The correspondence involved in initiating the line construction and the memoranda on the conferences between the power and telephone companies were read, and typical questions that might arise in such cases were asked by power men and answered by the representatives of the Bell and allied telephone companies present. It is assumed that all solutions would be reached under the principles and rules already adopted by the general joint committee representing the National Electric Light Association and the Bell companies.

The second problem, presented by O. H. Bundy, Central Hudson Gas & Electric Company, Poughkeepsie, N. Y., involved a hypothetical case where a telephone company was experiencing inductive troubles and desired in addition to make extensions of its circuits. This discussion was given in the same way, the hypothetical correspondence and conference memoranda being presented and questions asked and answered by power and telephone men.

Experiences Related

Elmer T. Sperry in a few words outlined the inductive troubles between the early telephone and electric light companies that resulted in the meeting in 1885 at which the National Electric Light Association was formed. This meeting was held at the old Grand Pacific Hotel, Chicago, and it was expected only a few men would attend. About 140 were present.

Prof. C. F. Scott outlined the change that has taken place in the attitude of the telephone and light and power companies toward each other. This attitude has changed from one of mutual suspicion to one of mutual confidence. As a result a joint discussion of problems like the one taking place as he spoke, in which both telephone and power men could participate with the greatest freedom, had become possible.

A. P. Way, American Railways Company, Philadelphia, indicated that it had been difficult to reach common ground in inductive co-ordination matters partly because the expense involved has been allowed to influence decisions and said that both parties can hope for a solution of the problem only when a straight open view is taken and selfish interest is not allowed to enter.

R. F. Pack of the joint general committee paid a graceful compliment to the inductive co-ordination workers, giving the credit for accomplishment to the engineers of both utilities. H. P. Charlesworth, speaking for Bancroft Gherardi of the American Telephone & Telegraph Company, expressed Mr. Gherardi's regret at his inability to be present because of business out of town, and said that the work had passed beyond the formative stage, in which suspicion was present, and had got to the fact-finding stage. He said further that unless the facts were ascertained it would be impossible to get far.

Commercial Sessions

Four Commercial Bureaus Present Unusually Substantial Reports—Movement Started to Expand Function of Commercial Section

FIVE things stand out as of particular importance in the story of the Commercial Section sessions, Four of these are: (1) Enthusiastic indorsement was given the electric truck, and this indorsement was supported by the announcement of a national co-operative promotion campaign, for which a large appropriation has been raised. (2) An exceedingly informative and valuable report on residence lighting was produced and also an analysis and demonstration of store-lighting possibilities that should prove a distinct stimulus to this branch of the business, particularly as a practical advertising campaign has been made available for its support. (3) A very live session was devoted to the division reports of the Power Sales Bureau, in which an especial feature was made of the opportunities for the development of the industrial heating field, and the movement as well is to be supported by an organized national campaign of publicity and promotion adequately financed that will make this a notable achievement of the coming year's work. (4) A very careful study of the problem of compensating salesmen was an important feature of the merchandising session, but the discussion of the electric range possibilities overshadowed all else, and here again a project for national promotion has been organized and a campaign is to be conducted with a generous backing of money already pledged that promises a real awakening of interest and activity in range selling throughout the country.

But perhaps the most significant development in the entire course of the commercial program was the frank discussion on Thursday afternoon of the necessity for strengthening the Commercial Section itself by a determined effort to re-enlist the interest of the older commercial men of the industry and notably a considerable number of the ex-chairmen of the section. The hearty response which was expressed by the entire meeting on the announcement of the drafting of this "old guard" for duty was an indication that the need is now appreciated and the reform assured.

Strong Indorsement for Electric Truck

Commercial Men Discuss the Growing Opportunity for a Vehicle Load—San Francisco the Latest Convert to Its Desirability

EVERY interested discussion of the electric truck, its record and its opportunity, marked the first session of the Commercial Section program. A warehouse man prodded the central-station industry on the lack of support through the more adequate servicing facilities which it might give. A battery manufacturer analyzed the market and appealed for a larger vision on the part of electrical men in considering what the truck can be made to mean to the industry. It was announced that the San Francisco central-station company has become the latest convert and is about to embark on an extensive development program.

The meeting opened with Oliver R. Hogue, chairman of the section, presiding. In his address he sketched briefly the work of the section during the past year and paid tribute to the conscientious, persistent work that has been done by the various bureaus and committees. A nominating committee was appointed consisting of E. W. Lloyd (chairman), Joseph E. Becker, T. I. Jones, C. J. Russell and R. R. Young. The meeting was then turned over to Charles R. Skinner, Jr., chairman of the Electric Truck and Car Bureau, who presented the bureau report to the session.

Electric Truck and Car Bureau

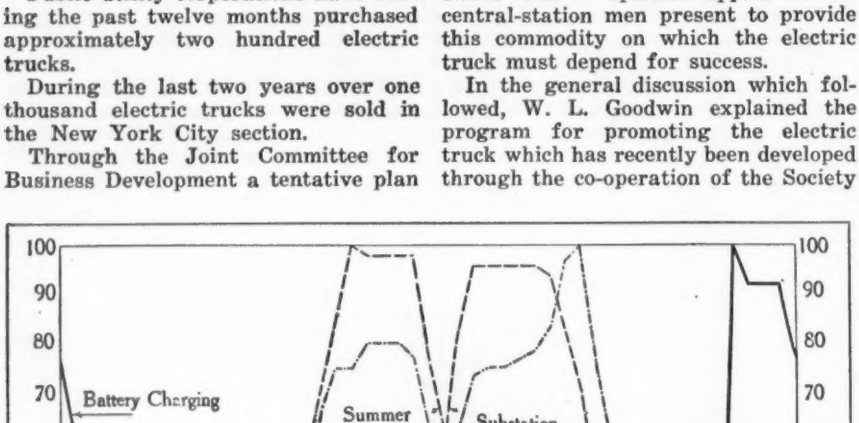
There has been a marked change in the method of selling trucks, he said. The former practice was for the manufacturer to endeavor to sell the central-station vehicles for its own use, and the central station was oftentimes permitted to apply them to unsuitable work. Today, however, the purpose is to secure the co-operation of the central station in the sale of trucks to local industries adapted to the electric vehicle. The Electric Truck and Car Bureau is actively supporting this work through the organization of two electric truck schools, one in New York and one in Chicago, to give instruction in the care, operation and maintenance of electric vehicles.

Central stations, appreciating the growth in electric truck transportation business, are following the lead of New York, Chicago, Boston, Hartford, New Orleans and Los Angeles in establishing departments equipped with the necessary expert talent to give advice on problems connected with electric truck transportation.

Public utility corporations have during the past twelve months purchased approximately two hundred electric trucks.

During the last two years over one thousand electric trucks were sold in the New York City section.

Through the Joint Committee for Business Development a tentative plan has been formulated for a more intensive all-year-around electric truck and car development program, which, however, was carried out supplementary to its report.



Load Characteristics—Electric Vehicle Battery Charging Compared with Total Substation Output

Charles F. Morris, past-president of the National Furniture Warehouse Association, followed with his earnest appeal that the electric vehicle should have more helpful support from the electric light and power companies through the provision of adequate service facilities. Mr. Morris is connected with one of the large metropolitan warehouses and is operating electric vans exclusively. Eighty per cent of all the trucking done by the big city storage warehouses, he says, lies within the range of the electric vehicle, and the fact that electric vans can be stored in the warehouse and carry a lower insurance rate gives them great advantage over any other system of haulage.

There is just one element of dissatisfaction with the electric truck in Mr. Morris' opinion, and that is the fact that when the battery on an electric truck begins to run down the driver cannot find a convenient place to renew it. The chauffeur of a gas car can always purchase more gasoline within a block or two or obtain other assistance. For the electric truck, however, there are at present, even in the larger cities, but a scant number of service stations, and many of them are inadequately provided for and inexperienced. As a result they do not welcome the electric vehicle when it calls, and the service is given with an air of toleration. He closed with a spirited appeal to the central-station men present to provide this commodity on which the electric truck must depend for success.

In the general discussion which followed, W. L. Goodwin explained the program for promoting the electric truck which has recently been developed through the co-operation of the Society for Electrical Development and the Joint Committee for Business Development, for which the society has appropriated $25,000. William Van C. Brandt, Philadelphia, pronounced this program the greatest single step in the promotion of the vehicle industry. G. R. Freeman, Chicago, announced that the Commonwealth Edison Company has appointed a committee of executives to study the problem of what can be done to speed up the truck market. The central stations in New Orleans, Cleveland and San Francisco, he said, have all put on vehicle salesmen recently and are more actively taking up the development of the electric vehicle load.

The importance of centralized control of transportation equipment was stressed by John Stilwell, general superintendent of transportation, Consolidated Gas Company of New York, in a short address. Mr. Stilwell is in charge of the motor equipment of the New York utility companies.

Supervision of Motor-Truck Equipment

Prior to 1902 he said the utilties of New York depended solely on horses for all trucking. Today the horse is practically eliminated and the work is being done by 757 motor vehicles. In short-haul city-delivery work the economy of the electric vehicle has been very pronounced. For instance, the transportation charges against one department in 1913 when it was horse-equipped amounted to $98,525.12. This department was completely equipped with electric trucks in the year 1917 and the total cost of cartage for the year was $55,403.53. This showing is the more remarkable when the increased business during these five years is taken into consideration. Any time or money spent on the selection of the proper type of vehicle, gasoline or electric, and the make and body specifications for the particular work to be done is amply repaid by the results obtained from using the vehicle best adapted for the particular service.

Another point which the speaker dwelt upon was the standardizing of equipment to the greatest possible degree, to have as few different types and makes of trucks as is consistent with the varied requirements of the service. Standardization of equipment greatly simplifies the repair-shop work, as a complete line of spare parts can be carried. Mechanics and repair men become accustomed to these particular trucks. It is also possible to transfer a truck from one department, which may be slack for the moment, to another department which is very busy.

An interesting story of the work of the electric vehicle school committee was told by Chairman E. S. Mansfield, Boston. As a result of a large number of inquiries from central stations as to how to start a vehicle department, it was decided to organize a vehicle school on the successful experience of the industrial heating school held some time ago. The vehicle manufacturers did most of the work and provided for all the costs, and to date they have spent over $10,000. Out of it, he says, have come the most useful data on transportation engineering that have ever been published. The first school was organized in New York on May 16 with about twenty-five attendants. A second school will be opened in Chicago on June 19, and at present there are applications from forty men. A third school is to be organized later in San Francisco. Ten men are already pledged, and twenty will probably be in attendance. As a result of this work, the subject of transportation engineering will be added to the N. E. L. A. educational courses hereafter.

National Increase in Use of Electric Motor Trucks

In an address on the national increase in the use of electric trucks, William Van C. Brandt, Electric Storage Battery Company, Philadelphia, called for a bigger vision of the electric truck opportunity.

There are now in service 10,457 electric motor trucks, consuming on a most conservative estimate 60,000,000 kw.-hr. per year. There are in addition 10,192 electrical industrial trucks and 15,000 electric passenger cars operating, which will treble this consumption. There will be sold this year at least fifteen hundred additional trucks, which will mean that there will be required 9,000,000 additional kilowatt-hours next year for the trucks sold this year. This is a

conservative estimate of the immediate market which actually exists today.

Those who have studied the question, said Mr. Brandt, assert that 70 per cent of the city and suburban delivery service is short-haul, frequent-stop work well within the radius that can be handled to particular advantage by the electric truck. If this is a fact, then the total possibilities for the electric would be 70 per cent of all vehicles used in city and suburban delivery service.

The speaker did not believe it would be stretching the vision to an impossible degree to consider it possible to sell in this country one hundred thousand electric trucks within ten years. To the central stations this would mean the sale, on a conservative basis, of 600,000,000 kw.-hr. of off-peak energy per year. It would help considerably to flatten out the valley which now exists in the load curve and at the same time it would mean a revenue, at 4 cents per kilowatt-hour, of $24,000,000 per year. It would mean to the truck manufacturer $20,000,000 sales per year. To the storage-battery industry it would mean $15,000,000 per year additional revenue from the sale of the ten thousand trucks per year and as much again in renewal sales. To the manufacturers of electrical equipment, excluding batteries, it would mean $3,000,000 per year.

In answer to an inquiry, Mr. Ray of San Francisco announced that the Pacific Gas & Electric Company acknowledges itself the latest convert to the electric vehicle, and gives the credit to the Electric Truck and Car Bureau. As a result of a close study of the work of the bureau, this company has become entirely "sold" as to the value of the electric vehicle load. The executives have given almost unlimited authorization to go ahead and build up the electric truck on the Coast. Announcement could not yet be made, he said, of the details of the program, but the plan will be in operation by June 19.

Electrically Equipped Furniture

The report of the electrically equipped furniture committee was presented by Ralph Neumuller.

Considerable strides have been made during the past year in the perfection of outlet fittings that simplify the electrical equipping of existing furniture.

The popularity of electrically equipped furniture depends largely upon the public interest that is aroused in it. The committee during the past year was able to secure a very large volume of publicity in furniture trade publications, in popular magazines, in select home-furnishing magazines and on woman's pages in the newspapers. It did not feel, however, that this was sufficient to create the necessary desire that will result in a more general adaptation of this innovation in American homes. What is needed is the interest and support of the entire industry. Manufacturers and central stations can assist materially by pictorially showing electrically equipped furniture instead of just ordinary furniture when the nature of their advertising requires furniture settings for appliances or other items.

O. R. HOGUE
Retiring Chairman

N. T. WILCOX
Chairman-Elect

If the thousands of men and women who are an integral part of our industry were each to equip electrically just one piece of their own furniture, the tea wagon or the dining-room table, for instance, it would afford publicity to hundreds of thousands of others. Central stations may lend a tremendous amount of support by sponsoring local campaigns for the wiring of just one piece of furniture by their customers.

In discussing the future of electrified furniture, J. F. Becker, New York, pointed out that wired furniture is of no use without convenience outlets, and that the work of this committee must have the backing of all the industry in the promotion of such outlets. Mr. Becker believed that if the central stations, manufacturers, contractors and other electrical interests could be induced to co-operate simultaneously in the promotion of convenience outlets a great advance could be made in the development of the use of electricity in the home. To this end he deplored any tendency to depart from the term "convenience outlet," because the combined strength of the industry is needed behind whatever name is used.

Commercial Service and Relations with Customers

Harold Wright presented a report on Commercial Service and Relations with Customers. During the last two years this committee has given to the industry ideas, presented in the form of "Service Suggestions," which have been found of practical value to companies in which they originated. The following "Service Suggestions" were issued this year:

September, 1922—"Identification and Appearance of Meter Readers."

October, 1922—"Educating Employees in the Proper Use of Electrical Appliances."

November, 1922—"Plans for Reporting Complaints and Submitting Suggestions for Betterment of Service."

December, 1922—"The Business of Your Company Is to Render Service and Courtesy to the Public."

January, 1923—"Proper Location for Meters."

February, 1923—"Telephone Orders for 'Better Service.'"

March, 1923 — "Improving Service Rendered to Outlying Communities."

April 1, 1923—"The Practice of Disconnecting and Reconnecting Meters in the New York & Queens Electric Light & Power Company."

Since the results obtained are extremely gratifying and the expense involved is small, the committee recommended that this work be continued during the coming year. The committee felt it should have contact by representation with a similar committee of the American Gas Association and hopes that during the next year that feature can be added.

Very strong indorsement was given to the work of the committee on commercial service and relations to customers in the general discussion which followed presentation of the report.

G. E. Miller, Cleveland, urged that the succeeding committee continue sending out reports of this nature through the year in convenient form for use by the central stations. Cleveland has put into effect four of the suggestions which the committee has made this year.

C. E. Barton of Long Island City acknowledged his indebtedness to the committee for the suggestion to take care of the rush of service orders at moving time. He applied this suggestion on May 3. Under the system of his company orders for setting and removing meters passed through three departments, but to meet the emergency the entire operation was concentrated in one department, which greatly increased the capacity to handle them. Mr. Farwell, Chicago, said that one of the best ways to simplify routine is to diagram it. The drawing of a diagram immediately shows up indirect methods and duplication.

Education

The session closed with the presentation of the report of the educational committee by Fred R. Jenkins, chairman.

During the past year the committee continued the publication and sale of the commercial engineering course and the course on practical electricity and offered for subscription three new courses on lighting sales, merchandise sales and power sales. It is anticipated that during the next year these new courses will be well established and in general use among central-station companies. Subscriptions to the commercial engineering course for the year ended March 1 were 189, an increase over the year previous. Subscriptions to the course in practical electricity for the year were 552. On the three new courses added subscriptions were received as follows: Lighting sales

course, 49; merchandise sales course, 112; power sales course, 82. All of the commercial courses have been self-supporting, and it is anticipated that with the support of the association and a suitable committee representation in each geographic section, the new courses will be maintained on a self-supporting basis.

Lloyd Prince and S. Bennett of New York and C. J. Liebman of Brooklyn reported benefits which they had experienced through the N. E. L. A. educational courses. In Brooklyn, in the case of a course on the organization and function of the sales department, more than 90 per cent of the sales department employees attended one or more lectures and 78 per cent were present at half or more of the lectures.

Big Commercial Opportunities in Lighting

Additional Loads and Attractive Revenues from Long-Hour, Large-Volume Business Await Central-Station Exploitation of Readily Accessible Field

The report of the Lighting Sales Bureau was issued in three parts, one devoted to residence lighting, one to store lighting and a third to six other specialized divisions. The residence lighting report, twenty-seven pages in length, which had already been published in the *N. E. L. A. Bulletin* and in *Electrical Merchandising*, presented a wealth of valuable data and constructive suggestions to aid in the development of better lighting for the customer and better business for the industry and was read by Dr. M. Luckiesh, chairman, of Cleveland.

Residence Lighting

The first part dealt with commercial possibilities. It contained statistics showing the various conditions of lighting, types of fixtures, character of glassware, number and wattage of lamps and convenience outlets in the middle-class homes of the country covering several thousand cases. It compared these actualities with a "conservative ideal" home and showed that there exists a possible increase in revenue of $125,000,000 to the central stations in the present wired houses.

The second part contained a plan for properly lighting the home. The various rooms of the house were treated and the styles of fixtures for these rooms enumerated.

The third part of the report dealt with selling residence lighting. It pointed out that actual demonstrations of lighting are much more effective than any method of mere description, and then followed a compilation of methods, data and results of demonstration rooms, exhibits and electrical homes held throughout the country.

Per capita analyses of residence lighting revenue, declared R. D. Cutler, Hartford, Conn., in discussing Dr. Luckiesh's report, offer more enlightenment than per-customer data. From 1910 to 1922 the annual income per customer changed little, the respective figures being $24.90 and $23.90, while the per capita income increased from $0.90 to $4.58.

W. G. Blackwell, Newark, N. J., urged the use of model electric homes in stimulating residence lighting business. Six such homes are now on exhibition in New Jersey. The speaker pointed out that duplex outlets cost little more than single ones and should be generally installed. E. D. Tillson, Chicago, said that on the Commonwealth Edison system for every minute the use of lighting is extended in twenty-four hours the company's income increases $100,000. Closing, Dr. Luckiesh advocated the use of shades on fixtures in model electric homes, pointing out that the glare has been present in too many instances in the past.

Store Lighting

The report of the store-lighting division was read by James Kirk, chairman, and presented a mass of valuable data in the nature of reports and illustrations, covering the possibilities of store lighting, including results of store-window and store-interior tests, publicity campaigns, interviews with merchants and a store-lighting booklet.

It characterized store lighting as the "untouched treasure chest," reporting on results gained in raising the "light level" in Chicago, classifying store "prospects," making definite recommendations for organizing a sales staff and suggesting successful ways to sell store lighting. Based on experience in Chicago, the committee estimated the possibilities for the complete development of store lighting in a city of that magnitude and of the respective sizes of Los Angeles, Duluth or Sharon, Pa., and told what this would mean, if applied uniformly throughout the United States, both in added profits to the merchant and in increased central-station load.

The sale of intensive store lighting, said George Miller, Cleveland, is one of the easiest jobs that the central-station commercial department encounters. One sales representative reported that not a customer called upon in four months in Cleveland had refused to listen to the message of improved illumination for stores. Up to June 1 the average intensity had been increased from 5 foot-candles to over 11 foot-candles. At high intensities the central station competes with daylight illumination.

Goods Sold Direct from Illuminated Window

R. D. Cutler, Hartford, cited experience with a recently installed window in which the Hartford Electric Light Company lends space to local merchants for the most modern illumination of their goods. Although this is on a cross street at the side of the company's office, popular interest has led to frequent withdrawals of particular items of merchandise from the window for sale to persons passing by who have been transformed into purchasers by the attractiveness of the display. In this way local merchants get the benefit of the latest practice in colored and plain illumination for windows without undergoing the expense of having their own establishments changed over without knowing just how the layout will look before the expenditure is made.

G. H. Stickney, Harrison, N. J., urged that members actually get to work upon increasing window-lighting intensities in order to derive tangible benefits from such practice. C. A. Musson, United Electric Light & Power Company, New York, touched upon the recent formation of a "Rainbow Makers' Club" to show merchants the best practice in utilizing colored lighting for window displays, and offered to share its experience and knowledge with delegates applying for advice.

J. Daniels, Boston, described successful surveys of large Boston department stores for improved illumination, which have increased the company's income $600 to $2,000 per month according to the installation. This company is about to intensify its store-lighting field work, beginning with improved illumination installed in its district offices and extended to nearby representative stores, with intensive canvassing of the forty-two municipalities served. J. Campbell, Brooklyn, emphasized the part that specifications and drawings showing outlet locations may have in central-station co-operation with contractors. It was also brought out that in New York today 10 foot-candles is regarded as a comparatively low intensity for the clothing trade.

The report showed that the energy consumed in signs and displays is increasing each year and that the rapid development of this class of business promises to be exceptionally high in the next few years. A careful survey was made during the year, and an interesting report of these statistics was included.

The trend toward illuminating billboards was shown to be developing rapidly, and increased interest in adequate maintenance was evidenced. The central stations have not capitalized this valuable load to the extent that it warrants.

Lighting of Large Buildings

The report of the division on lighting of large buildings brought out the important fact that central stations, realizing that approximately 60 per cent of their revenue is derived from lighting, are steadily adding men versed in illuminating engineering to their staffs to advise on lighting plans for new buildings and for the improvement of existing installations.

New building is continuing at a rapid

pace, and the new structures, together with many of the older buildings, are showing the results of the appreciation of higher standards of illumination. A report of additions to the bibliography of 1921 and 1922 was made, together with a table of recommended intensities of illumination.

The street and highway lighting division stated that street-lighting business has not always returned a fair interest on the investment and therefore has not been looked upon as an attractive load to the central station. There is no reason, however, why it should not undertake to sell better lighting on a business basis, for there is a public demand for better lighting from the standpoint of protection, safety and better business.

The year 1922 showed a decided improvement in street lighting, with exceedingly bright prospects for 1923. The report enumerated many improvements in lamps, standards, glassware and in various types of effective reflecting devices.

The report of the industrial lighting division was divided into several phases. The first covered a very thorough test, depicting the relationship of better lighting to output. The next pertained to portable lighting exhibits having for their purpose the education of the industrial public to the potentialities of good lighting. The next section dealt with lighting equipment and portrayed the importance of distribution. The following section covered the question of sales campaigns and helps, shown through the medium of pertinent charts. A bibliography of articles on industrial lighting appearing during the past year was appended.

The year was not noteworthy with regard to the development of equipment embracing any radical changes from existing types, according to the division on commercial aspects of lamp equipment. Many new pieces of accessories were developed, however. Attention was called to the advisability of luminaires being equipped with interchangeable attachment devices readily permitting the change of luminaires which would bring about the opportunity of increasing the service in lighting.

Industrial Heating of Prime Importance

Enormous Potential Load Awaits Development by Central Stations, but Executives Have Failed to Grasp Its Possibilities—W. S. Murray Outlines Superpower Outlook

POTENTIAL possibilities of industrial electric heating which indicate that this load will soon overshadow the motor load in the ratio of three to one monopolized the attention of the Power Sales Bureau at the third commercial session.

Attention of the Power Sales Bureau (C. K. Nichols chairman) during the last year was directed largely to the development of industrial heating, and a detailed report of accomplishments was given in the report of that division. The general power applications division (Ernest Pragst chairman) made no formal report at the convention, but devoted its efforts to the preparation of articles on power subjects for publication in the *N. E. L. A. Bulletin* and endeavored as far as possible to confine these articles to those industries where special requests were made for investigation.

The competitive power sources division (H. H. Holding chairman) started its work rather late in the year, and as the subject assigned to it is one requiring a very great amount of detailed study, no report could be made at this time. This division was instructed to study the comparative characteristics and costs of uniflow engines as well as the newer types of oil engines. Research engineers in different parts of the country are now carrying on these investigations, and as soon as they are completed the results will appear in the *N. E. L. A. Bulletin*.

W. A. Murray pointed out that the superpower system could not well be a company or a corporation as such a procedure might defeat its own purpose. He stated that super-utility would have been a better term and called attention to the fact that central stations have been practising its principles since they came into business. Mr. Murray traced the growth of the power business through four distinct steps: (1) Small companies first produced, transmitted and distributed small quantities of energy in their immediate territory only. (2) These small utilities then gathered themselves into groups and larger stations became necessary to supply the demand. (3) Expansion of these groups of utilities then followed, with further enlargement of power houses and the exchange of power between groups and stations. (4) Last came the present superpower plants and systems, with a very pronounced expansion of stations and interconnection. The present state of development stands for constantly increasing power plants and closer co-operation between companies.

Industrial Heating

One of the chief activities of the industrial heating division (Wirt S. Scott chairman) was to compile a list of manufacturers and users of industrial heating apparatus, something that has never been available. This division also conducted the industrial heating school most successfully during the past year, and it plans to organize additional schools in the different geographic divisions.

It is felt that the development of industrial electric heating up to the present time has been more or less accomplished on the "hit-and-miss" basis and very little concentrated and co-operative effort put into it, except by individual central stations or electrical manufacturing companies.

It is the consensus of opinion of those who have had an opportunity of giving this matter any study at all that the industrial heating load eventually will greatly exceed the motor load; also that the revenue obtained from a kilowatt connected of industrial heating load will show an average of double the revenue received from a kilowatt connected of motor load.

Commenting on the work of the industrial heating division, Mr. Scott defined it as making two kilowatts grow where but one grew before and predicted that ten years hence this load will be at least ten times the lighting load. To show what this business means to the central stations of the country, he stated that there has been 1,200,000 kw. of industrial heating equipment sold during the past five years. On an average this load brings between $50 and $60 in annual revenue per kilowatt connected, thus adding, in the aggregate, approximately $40,000,000 per year. Within ten years this may be confidently expected to grow to $400,000,000. He declared, however, that, although the industrial heating load has grown thus rapidly, the idea has not as yet been thoroughly sold to the central-station executives.

To promote the business the Power Sales Bureau has worked out a program with the Joint Committee for Business Development, which, with the help of the Society for Electrical Development, will carry out an educational and publicity campaign through the daily papers and trade journals. Speaking for the society, William L. Goodwin stated that $25,000 had been appropriated and is now available for this purpose. He outlined the general methods by which the program would be carried out and expressed the pleasure of the society in being able to aid the Power Sales Bureau in its work.

C. F. Hirshfeld Urges Growth in Heating Load

Failure of central-station executives to recognize and lend their wholehearted support to building up the industrial heating load was reiterated by C. F. Hirshfeld. He warned against electrical men being too confident of the superiority of electric heating over fuel heating as the combustion men are constantly improving their apparatus so that in many respects it is now on a competitive basis. He urged central-station men to put forth as great an effort as possible at this time to obtain industrial heating business in order that it may become firmly established as an essential part of manufacturing operations.

Looking into the future development of electrical heating apparatus, Mr. Hirshfeld pointed out that much of the equipment was converted fuel apparatus rather than true industrial electric heat-

ing. Experimental developments indicate that some processes which are now being done in converted combustion equipment can be done by the direct application of electric current to the material to be treated. In addition to induction furnaces, nut and bolt heaters and the Northrup high-frequency furnace, which are true electrical applications, japanning and enameling operations may soon be done by an improved method.

J. C. Woodson pointed out that electric heating equipment is almost twenty-five years behind the development of other electrical apparatus. But this fact alone proves its merit, judging from the insistent demand for its use in industrial applications. He urged that, if the expected volume of this business is to be realized, attention must be concentrated upon the standardization of equipment wherever possible. Special applications should be discouraged.

Stephen Bennis, H. H. Russell, John H. Mitchell and V. M. F. Tallman paid high tribute to the work of the manufacturers in conducting the industrial heating schools and courses of instruction for central-station power representatives. At the suggestion of Mr. Tallman, a motion was passed unanimously by the Power Sales Bureau expressing its appreciation of the manufacturers' hearty co-operation. The session was closed by Chairman Nichols, who urged upon all those present the necessity of convincing central-station executives of the importance of creating in each company facilities for the proper and intelligent development of the industrial heating load.

Frank W. Smith Prize Awarded

During the session the regular business was suspended while President Smith awarded the first Frank W. Smith prize of $100 to Cunard C. Nelson of the Edison Electric Illuminating Company of Boston.

Salesmen's Compensation Feature of Merchandising Meeting

Training of Salesmen and Testing of Appliances Discussed Before Large Gathering—Spirited Indorsement of Electric Range Opportunity

THE Merchandise Sales Bureau presented one of the most substantial reports ever delivered before any meeting of the commercial section in recent years. F. D. Pembleton was in the chair and in his introductory talk dwelt at length upon the importance of the appliance business to the modern central station. However, in spite of the fact that the subject has been very conspicuously before the industry for the past year or more, there still remain a great many executives who do not yet consider it one of their major problems. Many policies and many details still need to be worked out, but perhaps one of the most urgent needs is to thoroughly sell among central station men themselves the conviction that the central station has a big merchandising job to do.

In the absence of E. A. Edkins, chairman of the education and training of sales people division, the report was presented by Henry Kobeck.

In the opinion of the committee, the industry today is suffering for want of more and better salesmen, and this need is accentuated by the rapidly changing conditions in retail selling. After the spectacular collapse of the "buyers' market" three years ago, when it became painfully apparent that the buying public were staying away from stores, there developed an unprecedented demand for salesmen. The supply, of course, was, and still is, inadequate. In the effort to meet this demand thousands of unfit men have been "hired and fired," and the turnover has been tremendous. It is obvious that these new conditions cannot be dealt with successfully, either by the employment of inferior men or by attempting to recruit sales forces from those of other industries. The proper economic solution is to employ men who are at least reasonably well educated, personally presentable and mentally alert, and then train them in the industry's schools.

The committee was of opinion that the problem of developing good salesmen begins in the employment bureau. Too much money is spent in futile efforts to make salesmen out of the wrong kind of men. Not enough has been spent to get the right kind of men. Detailed recommendations on this point were offered.

The sales analysis division presented in its report a summary of some of the most successful sales campaigns that have ever been conducted in this country. The analysis sheets upon which the report is based are on file at national headquarters, where any one interested can study them. They embrace in detail experience in selling vacuum cleaners in Providence and Kansas City, washing-machine sales in Portland, Oregon; range campaigns in Raleigh, N. C.; Summit, N. J., and Vincennes, Ind.; toaster sales in Boulder, Col.; portable heater sales in Salem Mass., and selling general household appliances in Chicago.

Standardizing and Testing

In presenting the report of the standardizing and testing division, R. S. Hale, chairman, announced that the purpose of his committee is not to establish standards, but rather to encourage tests that will develop testing processes and a higher standard of quality in appliances and accessories.

The standardizing and testing division had, through conferences with manufacturers and others, endeavored to establish proper methods of testing which may be used by any one for the purpose of determining the durability of an appliance, believing that when proper testing methods are universally adopted, or adopted by at least most of the manufacturers, member companies will be able to select appliances with much greater assurance that they will give satisfactory service, and manufacturers will find it much easier to sell appliances.

Basis of Paying Salespeople

The report of the division of the basis of paying salespeople was one of the most instructive contributions on the commercial program and in the absence of Howard A. Lewis, chairman, was presented by Mr. Pembleton.

The committee interviewed a number of the biggest sales organizations in the country, secured their schedules of payment and methods of operation, and presented this information in a definite concrete form so that member companies might make a detailed study of the different systems employed and intelligently compile their own schedule of payment for their salesmen.

The committee report made an analysis of the favorable position of the central station in the community for undertaking the sale of household appliances, and a detailed study of the question of a drawing account and the conditions under which money should be advanced to salesmen. It also described the difference between the house-to-house selling of well-known and easily demonstrated appliances and the "negotiation soliciting" entailed in the introduction of appliances still in their pioneering period and considered the basis of compensation appropriate for both.

C. E. Greenwood, Boston, raised the point that central stations should be able to hire salesmen at a smaller commission than other merchandisers of electrical equipment, because in representing the central station the salesman has a preferred position with the public and gains the entree to the home more easily. This was corroborated by G. J. Liebman, Brooklyn, in describing a compaign to sell house wiring in Brooklyn last year. The Brooklyn Edison Company financed the contracts and made the collections. The contractors did the selling for a term of weeks. At the end of this period, when the central station advertising was discontinued and the contractors' salesmen were no longer able to introduce themselves as representatives of the lighting company campaign, they found it very much more difficult to sell house wiring.

The electric cooking and heating division reported that there are upward of seven thousand communities where a heating and cooking rate of 5 cents or less is available, which is about half of the total number of communities having a twenty-four-hour electric service. C. O. Dunten is chairman.

Of that portion of the population of the United States living within the zone of central-station service only about 25 per cent have a heating and cooking rate available. It is estimated that there are about 200,000 electric ranges in use at this time, an almost negligible fraction of the total business possible of being developed in communities where electrical service should logically be the chief dependence for cooking.

The chief activity of the committee was devoted to an effort to create an organization which would vigorously promote a more extensive range business. This was accomplished through the formation of a special joint committee composed of the cooking and heating divisions of the N. E. L. A. and representatives of manufacturers and distributors working in conjunction with the Society for Electrical Development. Arrangements were made with the society to carry out the program outlined by this joint committee working in close co-operation with the Joint Committee for Business Development.

The importance of adequate demonstrating in the sale of electric ranges was stressed by Don Ray, San Francisco. He said it is absolutely essential that a woman trained in domestic science call on the purchaser immediately and demonstrate the appliance, calling up to find out whether everything is doing satisfactorily. If this is done and the customer is satisfied at the end of sixty days, the range will never come out. The Pacific Gas & Electric Company has set a bogey of 2,500 ranges to be sold this year, and at the end of the first four months was ahead of the quota.

At present there are 5,436 ranges in service on the lines of the Idaho Power Company, and J. F. Orr, Boise, reported that the company is very much interested in developing tests on the lines to determine the diversity and demand factors of the electric range load. This work is being actively taken up by the Northwestern Geographic Section with the expectation that it will be possible to put on a man to give his entire time this year to making tests in different cities and under varying conditions.

Eastern central station men were urged by J. V. Strange, Portland, Ore., to put more effort immediately behind the electric range. The sales began on the Pacific Coast ten years ago, he said. Then the work dwindled until the point was reached where but a very small percentage of the houses remained unwired and the central stations of the Coast turned to the range as the next step in development. The same evolution will follow in other parts of the country inevitably, and it will be far easier and more profitable for the power companies to undertake the work now when it can be developed systematically and with deliberate planning, than to wait until public demand forces quick action. In Spokane, he said, there are at present 40,000 homes connected and 4,000 ranges in service. In one period of six weeks this year 429 ranges were sold in this city, and this business in itself raised the income per residence $1. No one need fear, therefore, that the rewards will be insufficient.

W. L. Goodwin congratulated the range division on the progress which has been made since the Denver meeting, when it was so enthusiastically decided that something should be done. In ten years of range selling, he said, approximately 200,000 ranges have been sold in the United States. It is not generally appreciated that 50 per cent of these ranges have been sold east of the Mississippi River. It is this lack of appreciation of how widely the electric range has been distributed over the country that is the greatest obstacle to progress. Men who believe in the electric range must undertake at once the job of converting the executives of the central station industry, so that they may be able to secure the permission, authority and financing necessary to such a market development.

Lloyd Appeals for Support

A very moving appeal was made by E. W. Lloyd, preliminary to his report as chairman of the nominating committee, that better support be given by the central station industry to the N.E.L.A. commercial section. Executives are talking today of doubling the capacity of our central station system within the next five years. That means a tremendous job for the commercial men and will demand the very highest quality of leadership. Unfortunately, he said, the older men have drifted away from the commercial section, and for several years past the majority of the ex-chairmen of the commercial section have not been active at all in its affairs. This tendency has been in marked contrast with the technical section, where the older men continue active in the affairs of the section, serve on its committees and contribute freely to the discussion of the ever-changing problems.

Various elements of public relations and customer ownership, he said, are essentially commercial subjects, yet they have been relinquished and are today included in the programs of other sections. Mr. Lloyd announced that he had already made a recommendation to the executive committee that the commercial section be called into consultation in such details of the work of the public relations section as may be of importance to commercial men.

Election of Officers

The following names were placed in nomination by the committee and unanimously elected to serve for the ensuing year: Chairman, N. T. Wilcox, Boston; vice-chairman, W. R. Putnam, Boise; vice-chairman, F. E. Pembleton, Newark; vice-chairman, George H. Jones, Chicago. For members of the executive committee, A. F. Berry, J. G. Tridle, A. K. Baylor, and to fill the unexpired term of Rawson Collier, W. E. Clement, New Orleans.

In congratulating Mr. Wilcox on his election Mr. Hogue recommended to the incoming administration that twelve members at large be appointed to the executive committee instead of six as in the past and that six of these members be ex-chairmen of the commercial section drafted for active work to the end that the commercial section may be strengthened and developed to a higher degree of responsibility and usefulness.

Range Committee Meeting

Facts of Successful Range Experience Must Be Interpreted to Executives to Get Action

An extra session of the range committee was held on Friday afternoon to give further discussion to range experience and plans. W. L. Goodwin described in detail the promotion program which is to be organized behind electric range developments this year. F. D. Pembleton, Newark, N. J., dwelt upon the difficulty in overcoming the indifference of the central-station executive. There was a free discussion of the urgent need for searching out the facts of successful range experience and selling them to the central-station industry itself so that executives may become more understanding and enthusiastic as to the possibilities which lie ahead.

J. V. Strange, Portland, Ore., said that with all the Pacific Coast experience they cannot say how profitable the range business is, but they are endeavoring to find the answer, realizing that the greater the load is built up the more profitable it is bound to be. Don Ray, San Francisco, in answer to the question of whether ranges can be sold to combination companies in competition with the gas range, stated that the difficulty was generally overestimated. The Pacific Gas & Electric Company is selling electric and gas ranges at the same time. Their salesmen are competing for the business, though, of course, not disturbing existing installations.

J. F. Orr, Boise, described conditions in the Idaho territory, where range installations have developed an 11 o'clock peak load.

C. O. Dutton, Springfield, Ill., told of eight years of experience there. Their first thought was to sell to the wealthy people. Now nearly five hundred ranges are in use in the homes of miners. An analysis several years ago showed that 90 per cent of those purchasing electric ranges there were more than forty years of age. A recent analysis showed that only 60 per cent were persons over forty years of age, indicating that persons of smaller means and less established homes are entering the market. They used to think that it was impracticable to sell to the renter. They find now, however, that a very large portion of their customers are living in rented houses, many of whom pay for the services themselves and move the ranges when they move.

H. E. Young, Minneapolis, reported ranges on an established basis in that city, with more than three thousand ranges in service and sales running uniformly about 200 a month.

Accounting Sessions

Activities of the Accountants Are Broadening Each Year—Efficiency of Personnel Increases to Meet Greater Responsibilities

A WIDENING outlook upon the industry, combined with a lengthening arc of contact with its administrative and operative problems, characterized the proceedings of the National Accounting Section, which culminated in well-attended sessions at the forty-sixth convention. The spread of the uniform classification of accounts into sixteen states and favorable prospects for its general adoption throughout the country in the comparatively near future mark the success of perhaps the most important work thus far undertaken by the section. General satisfaction in the acceptance of this classification was in evidence at these sessions. The co-operation of the various public utility commissions in this movement and the support of other national organizations have been vital factors in its advancement.

Improved methods of purchasing and storeroom accounting received much recognition at these sessions, with general agreement upon the importance of expediting procedure to take advantage of cash discounts and of reducing routine to the lowest practicable terms consistent with comprehensive and accurate records of operating transactions. Gratifying progress was noted in enrollments for accounting educational courses and in plans for the betterment of the advanced curriculum during the next few months. From all evidences the Accounting Section is hitting a stride toward higher planes of activity in which a closer co-ordination with other utility organizational tasks will be a dominant feature.

While considerable discussion took place at these sessions upon budgeting company expenditures, carrying forward the thoughts advanced last year upon this subject at Atlantic City toward the realm of wider application, there was general realization that the budget problem is destined to become more and more important in company planning. The subject is a very live one, and its scope is so broad that this year's program gave it a prominent place on the schedule. Billing by machinery, the insuring of property records, and the improvement of customers' records, security holders' records, payroll standardization practice, merchandising accounting and mortgage and trust agreements, received much attention. All these topics evidenced a larger activity on the part of accountants in utility affairs.

Accountants Seek Greater Efficiency

Gratifying Progress Noted Among the Companies in Acceptance of Uniform Classification, Stockroom Practice, Purchasing and Education

MARKED evidence of the broadening of accounting interests was displayed at the opening session of the Accounting Section in the Hotel Biltmore, Monday afternoon, under the chairmanship of William Schmidt, Jr. General satisfaction was voiced at this session over the spread of the uniform system of accounts in the country and also over the growing interest of companies and employees in education and in improved methods of purchasing and storeroom procedure.

In his annual address the chairman of the Accounting National Section, William Schmidt, Jr., reviewed in considerable detail the history of this section during the past twenty-one years. In commenting on the uniform classification of accounts for electric utilities, which has been worked on during the year in conjunction with the National Association of Railway and Utilities Commissioners, Mr. Schmidt had the following to say:

"Now that the classification has been recommended, it remains for the Accounting Section actively to urge its general adoption. There still is much work to be done in seeing that it is accepted by all the regulatory bodies and that electric utility companies follow its rulings. The importance of accounting work in the successful operation of the utility companies, the absolute necessity and urgency of a uniform classification of accounts and a thorough agreement as to its interpretation by the regulatory bodies have been more fully realized of late. If the classification is followed and a harmonious interpretation is agreed upon by both the regulatory bodies and the accountants, little trouble may be anticipated in substantiating the statements or reports when called for in a rate investigation or by any other requirements of commissions."

Mr. Schmidt then commented briefly on the work of the various committees of the Accounting Section.

Purchasing and Storeroom Accounting

This year the purchasing and storeroom accounting committee (J. F. Torrence, chairman) departed from the custom of previous years of reporting the practices of member companies and in its report has prepared and recommended a system for keeping purchasing and storeroom records. From the methods used by various companies which were obtaining almost identical results by different methods the committee has devised a system providing an alternative standard budget which

has proved satisfactory in actual use. While it is designed primarily for large and medium-sized companies, the smaller companies will find the principles applicable to their requirements, even though they do not follow the whole procedure.

The system, as prepared, divides the fundamentals or broad classes of the subject as follows: Ordering, purchasing, receiving and checking, storing, disbursements and returns, accounting, and material and supply purchasing.

A long discussion of the detail of handling invoices and remittances so as to take advantage of cash discounts followed the report, the speakers favoring the making of arrangements to insure this where possible. Several companies remit upon receipt of invoice or within the stated period of which the discount applies; others remit after receipt of shipment and by arrangement are still able to take the discount. Usually the invoice is kept in a suspense or other special account until the storekeeper announces the receipt of the material, and in many companies more care is being taken to insure that the stockroom follows these matters closely.

W. F. Stevens, Boston Edison Company, said that a recent study showed that about 54 per cent of the orders purchased through the stores department represented 2 per cent of the total value of orders thus placed. The importance of handling such orders through an emergency or petty cash account was touched upon.

J. E. Van Horne, Dallas, Tex., outlined the purchasing facilities of the Texas Power & Light Company, which serves 108 towns in twenty-one districts. Each manager has a petty cash fund of from $200 to $5,000, depending upon the territory. A large central storeroom is maintained through which orders clear when time permits. Requisitions are checked first against the material card system in the central stockroom, then by the operating department, and thence are sent to the purchasing agent.

C. E. Olwine, Newark, N. J., said that his company finds little difficulty in reconciling the inventory with the controlling account in the general ledger.

M. W. Glover, Pittsburgh, advocated discounting bills ten days after receipt of material. Ninety per cent of the West Penn company's bills go through without losing the discount.

C. E. Marden, Chicago, said that the Commonwealth Edison Company maintains a perpetual inventory with daily check-ups by five overseers who devote their time to visiting stockrooms.

In closing Mr. Brock said that the committee recommends that all requisitions which reach the purchasing agent should carry all necessary department head approvals.

Accounting Education

The two courses of the Accounting Section showed a substantial increase in enrollment during the past administrative year of the association. The accounting education committee (Fred R. Jenkins, chairman) reported that up to March 1, 1923, for a period of twelve months since the previous report, it had obtained 287 subscribers for the elementary course as against 182 for the same period the year previous. For the advanced course during the year ending March 1, 1923, the committee received 107 subscriptions, as against seventy-three for the corresponding period of 1922. Improvement in the organization for grading and other detail work of conducting the courses has resulted in the elimination of virtually all complaints from subscribers. The correspondence service now is giving prompt and satisfactory results. The revision of the elementary accounting course of last year has resulted in a larger enrollment and much more satisfactory service. Interest in the accounting courses was greatly augmented this year by the Frank W. Smith prize, which President Smith donated to be awarded by the education committee.

WILLIAM SCHMIDT, JR.
Retiring Chairman

M. A. JONES
Incoming Chairman

During the past year there has been a marked improvement in the finances of the courses. Last year's report showed a deficit of $1,373.69, while this year a net surplus of $816.96 is shown. It was recommended that a special committee of a sufficient number be appointed to carry out a complete revision of the advanced accounting course, to be ready for enrollment by Oct. 1 of this year.

H. M. Edwards, New York Edison Company, highly commended the work of Mr. Jenkins and his associates, emphasizing the advantages of a high-grade accounting course, and E. J. Fowler, Chicago, urged the importance of revising the lessons in the advanced course, in order to include the latest thinking of the active practitioners in this branch of the industry.

Franklyn Heydecke, Newark, N. J., spoke of the growing interest of employees in the Public Service Electric Company in educational opportunities. Last year 103 enrolled in the course in practical electricity, nineteen in commercial engineering, and fifty-three in the advanced accounting course. The speaker said that his company has recently employed one man to take charge of educational work. He strongly advocated this plan for other companies, at least to the extent of placing the educational activities in the hands of one responsible and interested person.

Preservation of Records

The committee on preservation of records (Franklyn Heydecke, chairman) made some very excellent recommendations for the safekeeping of valuable records and documents of public utility companies. The committee emphasized the failure of many companies to provide proper and ample equipment for the safe filing of valuable records. While it is possible to obtain record insurance, the cost is comparatively high, and the committee pointed out that the best solution of the problem appears to be absolute physical protection carried to its practical limit. As a means of preserving such documents as deeds, engineering reports, tracings and so forth, the committee recommended the use of either absolutely fireproof vaults, or if the volume of records to be kept warrants the expenditure, the use of an isolated document building. The committee pointed out that too often useless records are kept which only add to the fire hazards and recommended that there be a periodic destruction of such records. To this end an elaborate tabulation of documents and records, and the length of time which they should be kept on file before destruction, has been prepared by the committee.

C. S. Dressler, New York Edison Company, said that this organization is now centralizing its records and putting them in proper order. E. J. Fowler, Chicago, suggested that the committee should draw up rules and standards for the destruction of old papers, which should be a matter of good housekeeping, in view of the interference and danger resulting from excess material. J. R. Abercrombie, St. Joseph, Mo., urged taking the initiative in the destruction of useless records; otherwise utility commissions may establish regulations to this effect which may be inconvenient. J. G. Reese, Baltimore, touched upon the difficulties of securing adequate insurance on records and other data destroyed by fire. Basement vaults are of dubious value on account of possible water damage. Personnel records should be kept a reasonable time, perhaps more than three years, on account of the possibility of damage suits or other legal proceedings.

An informal report on behalf of the filing systems committee was presented by T. G. Spates. This committee has not held a meeting as yet.

Uniform Classification in Sixteen States

Fixed Capital Records and Handling of Discounted Bills Arouse Keen Discussion—Keeping of Accounts Under Federal Classifications Obviated

SATISFACTION with the general movement toward standardization and increased efficiency as indicated by the progress toward uniformity in accounting was expressed at the second accounting session. With one-third of the state commissions now using the uniform classification of accounts, it is confidently expected that the remaining two-thirds will adopt the classification within the coming year.

Accounting, Classification of Accounts and Annual Reports

Promoting the adoption by public service and other commissions of the uniform classification of accounts recommended by the National Association of Railway and Utilities Commissioners has been the chief aim of the committee on classification of accounts and annual reports, of which W. J. Meyers is chairman. The classification has now been adopted as official by commissions of the following states: Alabama, Arkansas, Colorado, Idaho, Illinois, Kansas, Michigan, North Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin and Wyoming.

Massachusetts has issued a classification so nearly like the National Association classification that for the purpose of uniformity it is considered that she is in the list of states adopting the uniform system.

In addition to appearances before state commissions, representatives of the committee conferred with representatives of the Federal Power Commission and others in a discussion of its official classification for use by licensees under the federal water-power act. As a result the elimination of some of the objectionable features found in the earlier federal tentative drafts was brought about, and it was agreed to recommend to the National Association of Railway and Utilities Commissioners certain changes in its classification, principally in connection with the abandonment of its group of accounts for transmission and distribution. Further recommendations resulting from the Federal Power Commission conference were for a single account for taxes in the income statement and for the more general inclusion of minor rents among operating expenses.

In addition to its work in connection with the uniform system of accounts, this committee, in conjunction with a similar committee of the American Gas Association, developed a form of annual report which contains in the space of sixteen quarto pages all of the information essential to the administration of public utility statutes of the various states and appropriate for embodiment in annual reports.

Development of the Uniform Classification of Accounts

The development of the uniform classification of accounts on which the committee on statistics and accounts of public utilities has been working in collaboration with the National Association of Railway and Utilities Commissioners was traced by Fred. W. Herbert, superintendent of the service department of the National Electric Light Association. Much of the committee's time during the last year has been devoted to bringing together the classification of the National Association of Railway and Utilities Commissioners and that of the Federal Power Commission under the water-power act. While the two classifications differ materially, it will not be necessary for licensees under the water-power act to keep separate accounts for the two classifications.

A provision made in Section 3 of Regulation 20 of the Federal Power Commission "Rules and Regulations" is quoted as follows: "If the records and accounts of licensees are kept and maintained under and in conformity with accounting rules and regulations prescribed by public utility commissions or other commissions or regulatory bodies of the state or states in which the project is located, the licensee will not be required to maintain also the system of accounts prescribed by Section 1 of the regulation, but the system of accounts prescribed by the state regulatory body may be substituted therefor if desired."

Inasmuch as the classification of the National Association of Railway and Utilities Commissioners, as now amended, meets the universal requirements of the utilities and the regulatory bodies, the committee feels that this classification should govern. As a matter of fact, where the state commission's classification is followed the licensees under the federal water-power act will not be required to keep both the federal and national classifications of accounts.

The National Association of Railway and Utilities Commissioners' classification of accounts can be used as a basis, and companies operating under the water-power act can incorporate in their accounting methods those special accounts which are made mandatory by the water power act only as additional accounts and be able to report to the Federal Power Commission accurately the transactions of their company. The classification as prescribed by the National Association of Railway and Utilities Commissioners applies more strictly to the operation of electric utilities in the several states and is in no way an interference with utilities operating under federal license.

With the presentation of Mr. Herbert's account of the development of uniform classification, H. M. Edwards, for the executive committee, offered a resolution to adopt the uniform classification of accounts as approved by the National Association of Railway and Public Utilities Commissioners. Upon motion the resolution was unanimously adopted by the Section.

Accounts Payable Records

The report of the committee on accounts-payable records, which was read by T. Wright in the absence of E. A. Davis, chairman, covered investigations of forms and methods in use by ninety-two average-size companies. Machine methods of vouchering were not considered in the report, as the committee felt that such methods would be applicable only to the larger companies. Particular attention was given to the methods of vouchering, including detailed information on numbering, indexing, forms, voucher register and cash disbursement records.

When describing the methods of vouchering, the committee found that where there are comparatively few the vouchering can be delayed until very late in the month and in some instances into the first few days of the following month. This method is ideal in that it reduces the number of vouchers to a minimum, but unfortunately cannot be followed by the larger companies without greatly increasing the vouchering force at the vouchering period to prevent an undue delay in the completion of the month's work. To overcome this peak in vouchering, recourse is had to voucher more frequently, either periodically or daily.

Under the periodic plan the invoice file is gone through at stated intervals during the month, say on the 5th, 15th and 25th, and all incidental invoices on hand are vouchered, withholding invoices from firms with which there are a number of transactions each month. These are Allowed to accumulate until the close of the month or until they have reached the maximum number of invoices assigned to a voucher. With companies having a very large number of invoices each month daily vouchering is necessarily a continuous operation. Under this plan also it is the usual practice to allow invoices to accumulate from those firms with which there are a number of transactions each month.

Where the vouchering is not continuous it is necessary to go through all invoices before filing and extract all discount items, which are vouchered immediately. When discount items are paid prior to the receipt of the material covered by the invoice, it is the usual practice to charge the net amount to the vendor's account or to a suspense account until the material is received, and it is then transferred by journal entry to its proper account. This process assures an exact account for the material, which might not be the case if the vouchering and payment of the invoice

closed the transaction. Some companies do not make a practice of taking discounts if the material is not received within the prescribed time for discounting, unless the amount of the discount is of consequence and the vendor known to be reliable.

The question of handling discount items aroused keen discussion by the members present. C. L. Hall thought it best to have all items approved first by the purchasing agent. M. W. Glover was in favor of charging all material to the material and supplies account and charging no material to construction or operation before knowing whether or not it was received and what the invoice called for.

Fixed-Capital Records

The reports of the fixed-capital records committee (C. M. Breitinger, chairman) presented a simple system based on the association's standard classification of accounts for keeping records of fixed capital. In accordance with last year's committee's definition of fixed-capital records as a continuous inventory record of the physical unit of property and plant, showing values reconcilable to book values and kept in sufficient detail clearly to locate and identify each property, this year's committee developed the system by dividing each of the accounts No. 311 to No. 345 inclusive into sub-accounts, each sub-account to care for a unit or a set of units of plants such as would give a simple record of the property. Included in the report were general instructions applying to the proposed system as a whole and to the several accounts, detailed instructions for treating the said property covered by each individual account and specimen sheets illustrating the application of the foregoing instructions. In all of this work the desirability of simplicity and the later opportunity for elaboration were kept prominently in mind, and in cases of doubt the simpler method of classification was adopted. The application of the system was shown in appendices submitted with the report.

The report covered only the allocation of charges appearing in work orders, which in turn are charged to the aforementioned accounts, and the correlation of these charges with units of property. The committee left for the future such further development and expansion of the fixed-capital records system as might be undertaken by the larger companies. In the available time, it was not possible for the committee to reach final conclusions on two technical problems which were left for future consideration. These were (1) the basis of valuation required for initiating fixed-capital records and reconciliation with general books, and (2) treatment of overhead and other undistributed costs and intangible costs.

After briefly summarizing the report, Mr. Breitinger suggested two possible methods of starting fixed-capital records: (1) By appraisal to be made carrying a reconciliation on the books for the difference in appraisal and book values; (2) by book value distributed on a proportionate basis with appraised value, thus eliminating the factor of reconciliation.

H. M. Edwards desired to go on record as opposed to any method of using appraisal, life tables or other "abominations" for arriving at fixed-capital accounts, taking exception to the committee's recommendation. W. J. Thorpe emphasized the fact that because of the lack of fixed-capital records in the past appraisals are costing companies a great deal of money and trouble to reconcile valuations before commissions. He urged the use of a work-order system which should be carried out in considerable unit detail, giving costs for both material and labor.

Mr. Breitinger closed the discussion, pointing out that a method of setting up a fixed-capital records system is essential for rate-making purposes. He also said that it was the intention of the committee to present only a basis on which future committees can develop and expand the system.

Accountant the Pilot of the Business Ship

A. Monro Grier of the Canadian Niagara Power Company Tells Accounting Session the Accountants' Position—Machine Billing Receives Favorable Comment

SPEAKING on "The Value of the Accountant to the Industry" before the accounting session Wednesday afternoon, A. Monro Grier, Canadian Niagara Power Company, a past-president of the Canadian Electrical Association, said that the accountant must be able to furnish his executives at all times with the information on income and earnings necessary for rate cases before regulatory bodies. "He must keep constantly informed," said Mr. Grier, "of the existing financial trends, know the rules and regulations of public regulatory bodies and the laws established for taxing purposes." In financial matters he must be able constantly to supply the best methods of avoiding possible pitfalls. His position makes him the recorder of the company activities and virtually the pilot of the business ship. He is the doctor who must diagnose the business ills of the enterprise and the one executive official, if any, who is entitled to a seat on the executive board so that he may know intimately the problems of the business. Mr. Grier closed with an eloquent plea for the maintenance of friendship between the British and American people. He extended an invitation to the delegates to attend the Canadian Electrical Association convention at Montreal, June 21-23. A similar invitation was extended by P. D. Davies, president of the Canadian association, and F. W. Fee, vice-chairman of the Accounting Section of that association.

Customers' Records and Billing Methods

The report of the committee on customers' records and billing methods, of which B. F. McGuire is chairman, includes a classification of billing costs for comparative purposes to be used as a help to the standard classification of accounts. It offers a basis upon which member companies can make comparisons of their billing costs. The classification of billing costs includes the items of meter reading, billing, duplicate bills, bookkeeping, bill delivery, credit and correction, customers' statistics, general supervision and total yearly cost. This classification is further divided by giving for each of the foregoing items the number of employees, cost per meter in service, cost per bill rendered and cost per customer. It is accompanied by an explanation of the different items listed in the classification.

During the year a sub-committee on methods and office appliances (J. F. Ford, chairman) was organized for the purpose of furnishing the smaller companies with details of the systems and office appliances in use by companies of similar size. Within the past year a number of member companies have been conducting tests with machines to be adapted to the customer's billing and bookkeeping work; also, tests of the Baltimore system modified and adapted to the individual needs have been made. The committee, however, did not believe that this work had been developed far enough to be presented at this time.

The discussion on the report of this committee was directed first to the "bookkeeping without books" methods of the Baltimore Consolidated Gas, Electric Light & Power Company, and favorable comment on the method was made by men experienced in it. The discussion of the comparison of costs of billing was summed up by Chairman McGuire, who pointed out the effect on costs exercised by complicated rate schedules and said that in using the classification suggested by the committee the companies planning to compare costs should get together and decide on how the work is to be carried out so that there would be no uncertainty as to the value of the comparisons.

Machine billing came in for comment, mostly favorable, but some unfavorable, as to costs as compared with older methods of billing. The experience of those who have used machine billing as expressed in the discussion indicated material savings where there are a large number of customers to be handled. The secret of saving of cost seems to lie in the combining of operations that under pen-and-ink methods must be handled separately.

Budget

During the past year the budget committee (D. W. Harris, chairman) attempted to establish contact with member companies carrying on the study of the fundamental principles of budget development and offering solutions for some of the principal problems met in budget administration. As, however, the report of the committee presented at last year's convention was not received until the middle of February, 1923, there was not sufficient time for the committee to obtain opinions of member companies on the complete report outlining the methods of budget preparation and administration. The committee therefore recommended that it be permitted to continue its researches for another year with a view to completion of the work already begun and of giving the association the benefit of further development in budget procedure. The report included discussions of practical problems met in budget administration, development in methods, construction and cash budgets, use of materials and supplies budgets and the procedure in preparing a budget under different conditions.

In presenting the report Vice-chairman H. A. Snow, Detroit Edison Company, emphasized the thought that the budget is not a financial instrument, but a means of controlling and directing business activities that is of valuable assistance to all employees of a company as well as to the officers. The period for which the budget is prepared is not important, though he said it should be for as far in the future as possible. That a budget is a strict limitation of expenditures Mr. Snow characterized as a fallacy. The budget should be flexible so that it can be changed as needed and plans altered as new conditions develop. Mr. Snow viewed the budget as a guide rather than a control instrument. He gave as one of the important problems the getting of dependable estimates. Estimates should be made by the heads of the departments responsible for the work, and four budgets, one each for construction, operation, storeroom stocks and cash, were recommended.

Louis F. Mussel, Cities Service Company, asked for the consideration of the budget not merely from a dollars-and-cents basis but as a means of developing the human abilities of the business organization.

Payroll Standardization

The payroll standardization committee (A. B. McCoard, chairman), after examining approximately fifty systems in use by various companies, prepared a tentative method which was outlined in detail in the report. The proposed method recommended the organization of a personnel department and an employment bureau if the size of the company warranted such procedure. The desirability of centralized payrolls was pointed out, and methods of reporting and checking time were explained, with suitable forms for this purpose.

Renewal Reserve Analyzed

Hon. Carl D. Jackson Presents Masterful Analysis of Reserve Accounts—Need of Revised Merchandise Account—Election of Officers

THE fourth and final session of the Accounting Section reached a fitting climax to a year notable for its accomplishment when it listened to Hon. Carl D. Jackson's remarkable address "Renewal Reserve." Calling attention to the fact that the word "depreciation" is nowhere used in the uniform classification of accounts Mr. Jackson pointed out that if a utility is well maintained and is rendering good service to the public there should be no element of depreciation of its property. Only when the physical property has actually been allowed to run down through neglect can the value be depreciated.

Merchandising Accounting Committee

The formation of the merchandising accounting committee, P. H. Myers, chairman, was the outgrowth of the meeting of the joint merchandising policy committees of the National Electric Light Association and the Association of Edison Illuminating Companies held in New York on Jan. 5, 1923.

Classification of merchandising accounts was adopted for use by all of the companies represented on the committee, each one agreeing to apply it to his own merchandising activities.

After the presentation of the report Herbert A. Wagner of Baltimore called attention to the importance of merchandise sales to the central station company but warned that it must be conducted on a profit making basis, and stated that executives were looking to the accountants to provide the proper means of analyzing the business. "Merchandising is one of the greatest possibilities of our business," said Mr. Wagner, "but if the central station cannot make a profit, how can we expect others to engage in the business and thus bring about the great volume of sales which we all believe possible?"

Speaking in the same vein, W. A. Jones said, "It is a sad thought that many companies have not gone into merchandising, which appears to be the keynote of central station business. This situation may be attributed to the cry 'it is not profitable' which has been caused largely by inaccuracy of records which have led to an entirely wrong conception on the part of executives." Mr. Myers stated that eleven companies are now co-operating in the application of a uniform system of merchandising accounts providing for the operation of the department as an entirely separate business from central station operations. Results of this trial application will be reported at a later date.

Security Holders' Records

The security holders' records committee (George B. Thomas, chairman) devoted most of its attention to the consideration of the legal requirements concerning the transfer of stock certificates. The statutes of the state in which a corporation is organized, federal revenue laws, the charter and bylaws of the corporation and the laws of the states in which stockholders or their representatives reside are often of vital importance in determining whether or not a corporation can transfer stock upon its records without subjecting itself to civil liability or fines and penalties. The report outlined in some detail the legal requirements for stock transfer, nature of stock certificates, variety of laws affecting the transfer, liability of the corporation, test of authority to transfer, handling of lost certificates and a set of instructions which has been used successfully by one company in its transfer department.

In view of the customer-ownership plan adopted by many large utilities, the committee urged the advisability of a utility cultivating the good will of its stockholders by assisting them in every way possible to transfer their shares in accordance with law and approved practice. The committee pointed out that a company which flatly refuses to make transfers unless certain legal requirements are met, without supplying information as to the practical steps and forms necessary, raises obstructions and invites dissatisfaction.

Mortgage and Trust Agreements

A detailed report on mortgage and trust agreement (W. C. Lang, chairman) embraces a description of mortgage securing bonds and a general analysis of the various types of mortgages now outstanding against public utilities. Among the outstanding recommendations of the committee was a form of mortgage permitting the issuance of bonds of different series in respect to interest rate, dates, maturity, redemption and other provisions in preference to a single series indenture, as, under this arrangement, a utility has one mortgage with several series of bonds in place of many different indentures. Among other recommendations was that a definition of net earnings, when a requirement for the issuance of additional bonds, should clearly indicate that the amount set aside for the purpose of maintaining a reserve for property retirements should not be included as an operating cost.

The following officers were elected unanimously for the ensuing year: Chairman, W. A. Jones; vice-chairmen, W. Paxton Little, W. C. Lang and A. R. Patterson; members at large, C. M. Breitinger, E. A. Davis, W. H. Hodge.

President Smith, at the close of the meeting, expressed his appreciation of the hearty support of the Accounting Section during his administration.

Symposium on Public Relations

Outstanding and Critical Importance of Complete Understanding Between Public and Public Utility Frankly Discussed by

W. D. B. AINEY, *Public Service Commission of Pennsylvania.*
ALEXANDER FORWARD, *Virginia Corporation Commission.*
E. V. KUYKENDALL, *Washington Department of Public Works.*
CLYDE M. REED, *Kansas Public Utilities Commission.*
H. G. WELLS, *Massachusetts Department of Public Utilities.*
MARTIN J. INSULL, *vice-president Middle West Utilities Co.*
JOHN B. MILLER, *president Southern California Edison Co.*
HENRY L. DOHERTY, *president Henry L. Doherty & Co.*
W. W. FREEMAN, *president Union Gas & Electric Co.*
ARTHUR WILLIAMS, *general commercial manager New York Edison Co.*

AN INSPIRING symposium on public relations, was the program of the third public relations session of the convention. It is impracticable to present complete reports of all ten addresses, but abstracts follow here.

Commission the Balancing Agent Between Public and Utility

BY W. D. B. AINEY

The relation between utilities and their patrons is to be expressed, it seems to me, in a formula, but not an ordinary formula. It is a formula of equation, simple and recognized by every one academically, but in the application of it very frequently misunderstood.

On the part of the utility there is the responsibility to render adequate service, and the corresponding privilege and right that grows out of that responsibility is that the adequacy of service shall be supported by just and reasonable rates. On the public side, consumers are entitled to receive at the hands of the utilities adequate service, and the duty which falls upon them is to pay a reasonable rate.

That is the formula—so simple—yet there has been a difficulty in its application. I think a part of that difficulty arises from the fact that the utility companies themselves have not carried their end of the program and problem to the knowledge of their patrons, and therefore they, the patrons, have not had at all times a clear understanding of the difficulties that confront the companies.

You know there are those who think that the great problems of life are ones that can be solved from the standpoint of the logician. Never was a greater mistake made. The emotional characteristics of mankind are the factors which in final analysis control his life and control the nation. It is not cold logic by which men judge either social, economic or political affairs; but it is those other things that when rightly related make up the finer sensibilities and expression of man. The interrelationship that comes between two men who have established a friendly handshaking acquaintance brings them to a conclusion that no amount of controversy on printed page would ever bring.

As to the public service commissions, the conception of the Pennsylvania commission is that it must maintain a fair balance as a corrective body, and whenever there is inadequacy of service it meets the complaint by an appropriate order. Whenever the rates are unjust and unreasonable, either from the standpoint of the utility or the standpoint of the patron, it meets that emergency, and we have attempted to do so fearlessly, without any question of whether it was politically suicidal or whether it was not. When the day comes in Pennsylvania that any other conception of public responsibility shall actuate the Public Service Commission, then I will present my resignation immediately.

A Utility with Good Public Relations Seldom Appears Before Commission

BY ALEXANDER FORWARD

You who are responsible for this very thing should know better than we of the regulatory commissions can possibly know that your treatment of your patrons may mean all the difference between success and failure, and that in your dealings with state tribunals, the rate-fixing powers and the city councils that grant or refuse municipal franchises the attitude of the public toward you is of the utmost importance. You already know that no executive who does not maintain the proper attitude of mind in this respect can for long retain his standing with his stockholders, nor, therefore, his position.

In my state—Virginia—the utility that receives the most considerate treatment at the hands of the public and its representatives is the one that never finds it too much trouble to talk things over through a responsible representative with a complaining individual. And the utility made to face the most persistent opposition to its proposals is the one whose organization is permeated with an attitude of indifference to the public and which, when ready to take any step, apparently gives no thought whatever in its own councils to the impact of its proposals upon the public mind.

In any state now where an electric utility has sold a large amount of preferred stock to its patrons, largely through its own employees and through local advertising, when any citizen asks the city council or the chamber of commerce to interest itself in securing a reduction of rates, the patrons who have that direct interest in the success of the business fall upon the said city council or chamber of commerce like a thousand of bricks to protest against any effort to impair the success of the company and injure thereby its service.

Some of our utilities, many of them in fact, recognize the fact that expert, intelligent and progressive service can succeed in part only unless the public knows about it. Many others do not indicate their grasp of this important point. Now, newspaper space costs money, but when intelligently used it is worth the price; and if it is not too much trouble to explain things to a patron, it certainly cannot be too troublesome to address meetings of civic and luncheon clubs and tell them what electric science is doing and planning in general, and what the utility in point is doing and planning.

All newspaper publicity does not have to be paid for. I pursued the newspaper business for twenty years, unless it pursued me, and I know that anything that the newspaper writer knows is going to appeal to the public imagination will receive from him a ready and responsive hearing.

Educate by Introducing Utility Regulation Into Civics Courses

BY E. V. KUYKENDALL

Errors of regulatory bodies are more likely to occur on the side of the public than of the utility. An examination of court reviews of commission decisions will demonstrate this to be a fact. I believe it is safe to say that state and federal courts have held three commission decisions unfair to the utility where they have held one unfair to the public.

Conceding that commission regulation should be continued, at least until something better has been devised to take its place, what should be done to insure its perpetuity? Commissions are creatures of the legislature, and the average legislator reflects the sentiment of his constituents. Unfortunately, many politicians are followers rather than leaders. The remedy, then, lies in an open, candid presentation of the facts to the public mind, the substitution of truth for error, and the eradication of prejudices born of ignorance and misinformation.

For some time I have believed and advocated that the fundamentals of valuation, rate making and regulation should be taught in the public schools as a part of civil government. These functions have become such important governmental activities, both national and state, that they should be included in textbooks on civics. A person informed on these topics would cease to be putty in the hands of the demagogue whose specialty is corporation baiting. For instance, if he understood even the rudiments of valuation, he would know the absurdity of the oft-repeated charge that regulative commissions are permitting utilities to make earnings on watered stocks and inflated bond issues instead of the value of the property devoted to public use. He would know that under regulation it is impossible for a utility to profiteer.

A good deal has been accomplished by your committee. Some steps have been taken toward the endowment of a chair or chairs in universities, but I cannot feel that that is the important thing. The important thing is to have those subjects taught in the public schools so that every high-school student will gain a knowledge of the fundamental principles which lie at the bottom of valuation, rate making and regulation. The pupils will go home and talk to their parents, and in a very short time all of this misinformation, this misunderstanding about utilities and about regulation, will disappear.

There are cases where utilities have incurred the ill will of the public by long-continued discourtesy or want of tact and diplomacy on the part of their employees or officials. In such cases the only remedy is a complete change of attitude on the part of the company. This change should begin by the discharge of every roughneck manager or discourteous employee who comes in contact with the people. Courtesy will gain and hold more friends and patrons than cheap rates and sheer efficiency combined.

Correct common prejudice through the unfailing exercise of courtesy, tact and diplomacy at all points of contact with the public. Educate along utility and regulatory lines. Reach the children in the schools, the men on the streets, and families in their homes, with a human and sympathetic appeal.

The electric companies have passed through the same character of hardship and vicissitudes that beset the pioneer home builders of both the Atlantic and Pacific slopes. They are entitled to a measure of the homage and appreciation so justly accorded the sturdy pioneers who risked all in the reclamation of the waste places of our continent.

Good Public Relations Will Be Most Appreciated if Adversity Besets the Industry

BY CLYDE M. REED

The fact now is that you folks have all the best of it. The fact is that you represent one of the rapidly expanding industries of the United States, if in fact it is not the most rapidly expanding. Your colleagues in public utility organizations have met with more difficulties than have you, and in making that statement and in drawing the conclusion that is to be drawn from that statement I am not underrating the intelligence with which you have approached your problem, even though I believe that that intelligence is greater than the approach to any other public utility line of business in the country.

The fact is that you have all the advantages of the public utility game in the rapidly developing needs of the public for your service. But if Henry Ford ever comes along and invents a match that will burn a whole day and a whole night and furnish heat for stoves and light for a whole residence, then you gentlemen will have your troubles just as the street car and electric companies have had theirs. You will then appreciate and need your public relations.

We live today in the age of the world's greatest romance, and you gentlemen, more than any other class of people I know, personify and reflect the execution and the desire of the most romantic thing in the history of the world.

It is up to you gentlemen and up to this association to continue along the lines of the very great efficiency that you have developed, along the lines of the great public usefulness that you have developed, and along the lines of continuing to aid and perfect and assist and carry on the development of our civilization.

If you fail to dedicate yourselves to that purpose, you will have failed to accomplish the great possibilities that lie before you.

Individual Private Contracts Ultimately Make Up Public Relations

BY HENRY G. WELLS

It is an interesting fact that the various complaints we receive in Massachusetts, in the gas and electric division, are confined virtually to one-fourth of the companies. And it is an interesting fact that those complaints from the public have all followed along certain definite lines as affecting the individual companies. In other words, they are characteristic complaints in each instance.

Of course, it may be said that companies in a large

community are handicapped, that companies that are near to the commission are handicapped, but a study of those complaints and of the one-quarter of those companies absolutely disabuses one of that idea.

There are companies that take the attitude that the customer is always right. That is not a natural attitude. There are other companies that indicate by their attitude, in spite of all the advertising they can put in the newspapers, that the customer is always wrong.

It is sometimes difficult to know whether to say that a customer is always right or always wrong; but let me give you one illustration that we had. It was an application for service. The company replied that it would require eight poles to connect up with the nearest line. The applicant, who was a very vigorous young lady, wrote back and said that the line ran right by her house. The company wrote back and stated that that must be some other public utility—perhaps the telephone company. The young lady went out and made a drawing of the stencil on the poles, took the numbers of the poles and sent that in to the commission. The commission communicated with the company, and the young lady received service.

That is just an illustration of the fact that the customer may sometimes be right, and perhaps after all it is a good idea, when an applicant states a certain thing as a fact, to investigate it.

ORGANIZATION IN PUBLICITY WORK

No matter how much you may advertise, no matter how much you may inaugurate a publicity campaign, unless your companies are so organized, or organized in the same way that your engineering departments are organized, you are not going to be successful in a publicity campaign.

However, the great majority of the companies are carrying out your teachings on public relations. But the other companies that have not organized their public relations department upon the same basis that they have organized their accounting and engineering departments ought to do so.

It seems to me that the companies that have the most trouble to organize should call on these companies that have not had trouble and study the particular features in which difficulty has arisen. The companies that have failed have done so because of certain characteristic features, and that is indicated from the fact that complaints affecting the different companies are almost invariably along certain definite lines. In one company it is a failure in the adjustment division and not in the commercial division; in another particular company it is a failure in the commercial division and not in the adjustment division.

[Mr. Wells related several incidents of complaints which had come before the commission, to show how simple and commonplace some of the cases are which cause misunderstanding and how easily they yield to the application of ordinary common sense and a mutual desire to play fair.]

I say to you in conclusion simply this: In your several states study the situation and find out whether there are certain definite lines along which the public service companies are falling down, and then correct them. That can be done in Massachusetts, and I have no doubt it can be done in every other state. The great majority, as in Massachusetts, of your public service corporations are doing the best they can, and I believe that they all sincerely desire to do their best.

Many Executives Not Yet Awake to Necessity of Public Relations Effort

BY MARTIN J. INSULL

I can honestly state that I think this industry is very greatly indebted to the public service commissioners of this country for the treatment it has received during the past few years. I don't mean by that that we have always got exactly what we wanted, but, taken by and large, we have received a square deal, and that is the most that we should ask for.

One of our greatest duties in this work of public relations is to so mold public opinion that public opinion supports, as far as possible, the action of the various commissions of the various states.

Commissioner Ainey very tersely gave us a formula for the utility business: Adequate service at reasonable rates. That is what we want; that is what the public wants. Why is there any difficulty between us and the public? The real difficulty is that our ideas of adequate service and their ideas of adequate service are probably the same, but our ideas of reasonable rates and their ideas of reasonable rates may be entirely different, because the subject is approached from a different point of view.

We approach it with a full knowledge of the utility business and the economic fundamentals of the business. As a general proposition, the public approach it without that equipment.

Who is responsible for the situation in which the public finds itself? Are not we? There is nobody else to tell it the fundamentals of our business unless we tell it to them. Are we to sit idly by and let people be misinformed by the political demagogue? Certainly not.

I agree that one of the best places to start is in the schools. We have already started to do some work in that direction. We can do more and more to a very great advantage.

Now I am not going to let you people sit here and take a compliment that I don't think you deserve. One of the commissioners said it was unnecessary to talk to you utility men about the necessity of good public relations. I do not agree with him. I think there are many men in our industry (and there may be men in this room) who have not yet caught the vision of what this public relation movement means. If you will sit down and quietly think about the utility business, you will come to the conclusion that the greatest interest in the utility business does not lie in the operator, but it lies in the public.

Take the question of reasonable rates. A misinformed man's idea of reasonable rates is the lowest rate he can possibly get for any particular service, yet a low rate might wreck the very industry which is his life's business blood.

To me the question of rates does not become of any importance until you consider the question of finance in the industry. It is there where the rate makes its greatest importance, because this industry cannot go forward, as it should go forward unless it can establish a credit that attracts money to it. That credit cannot be established unless it receives a rate that will establish that credit.

Now, neither you nor I can change public opinion alone. We can start, but this work has got to be done through our whole organization. We have got to support it.

Every man and woman in the organization of

an electric light and power company should thoroughly understand the importance of a favorable public opinion toward this great industry all over the nation.

Utility Commissions Should Use Publicity to Interpret Their Decisions to the Public

BY JOHN B. MILLER

Publicity is very largely responsible for our relations with the public, and the commissioners, to a degree, are responsible for that publicity. The suggestion which I have to make is that no public utility commission is properly organized without a first-class expert publicity man to get the message, the real gist of their decisions and actions over to the public. I don't mean to get out reports. Who reads them besides us? The public does not. I don't mean long articles in the newspapers that are garbled, or even if they are in full are not properly news stuff. The publicity man of the public utility commission should take a rate order, for instance, prepare his stuff with headlines which tell, in a few words, just what has happened and why, and then let the rest of the story give an interpretation. But the headlines must be right, for that is what our public reads.

I think commissioners should be impressed with the fact that that is a proper and necessary part of their function in connection with the industry as a whole. Publicity can be good and it can be bad. It is very important that our commissioners should have good publicity.

Commissioners Should Take Notes of Failings and Tell the Industry About Them

BY HENRY L. DOHERTY

I have sometimes been afraid that the almost unanimous indorsement that the electric light men have given to public service commissions would make the public think that we like public regulation by state commissions, and very often anything that we want they conclude must be wrong. Anything that we like they often conclude is not in their interest. As a matter of fact, of course, we are not seeking regulation, but if we must be regulated, we want intelligent regulation.

I want to say a word for the state commissions that perhaps has never occurred to most of you gentlemen, although I suppose it has occurred to them. I think we have all learned a good bit from public regulation by state commissions. I think a great many of us were in a rut; we didn't realize what we could and what we could not do.

I wish that we could have as many of the public service commissioners as would do so make a note all through the year of everything that they observed where they thought the public service company was wrong and come to our convention and tell us about it. In the last analysis, service cannot be merely lip service, and I know, having been the active manager on the job, how difficult it is to make every employee realize that he must do everything he can to give that customer what he thinks he wants, regardless of whether we think it is what he wants or not.

I am one of the advocates of making a customer pay for what he gets. I believe in that theory, but I believe in the other thing of letting him have what he wants, but be sure to be able to serve him with what he does pay for.

How many rules have you got that are good for nothing except to have holes shot in them? Then how often, if the man could get into your office—and here is the thing that is hardest of all to guard against—if you could deal with every customer you could put a smile in what you had to say and you could put it there in the right sort of way. You can tell your man to be courteous at the desk, but courtesy with him is often a kind of an insulting thing. You have got to make him feel in his heart that he is trying to serve the public, that he is trying to give each customer what he wants as nearly as possible.

I am very serious and I believe I voice the sentiment of most of the men in this meeting when I say to these commissioners that we invite intelligent criticism, that we would welcome having them make a note of everything that goes wrong that they see in the course of a year, come to our conventions and tell us about it.

I believe that our commissioners can do something more. It must be plain to everybody that we never can have peace if either the buyer or the seller is going to fix the rates. That is the great justification for the state commission. Of course, as one speaker pointed out properly, the state commission must necessarily lean toward the public, and the majority of decisions must be in favor of the public. Nevertheless, the commissions are a more disinterested body than either the buyer or the seller, and there is a chance for peace.

I am heartily in favor of this particular program that we have had here today, in inviting these public service commissioners in here to talk to us, to let us get closer to them and to figure out the problems that they are charged with and that we are charged with, because we are both charged with the duty of giving service to the public. They can't do it unless they know our position, unless they know us and know what we are working for and how we are working to it, and we can't do it withou knowing them.

After Forty Years of Inaction at Last Utility Men Compete for Excellence in Public Relations

BY W. W. FREEMAN

It occurs to me that some of us may question in our own minds why it is not until the forty-sixth convention of this association that we devote so much time and give so much importance to the subject of public relations. In my opinion, that does not indicate that we have been asleep or that we have been neglectful of opportunities in the past. It means, rather, that in the evolution of our industry and of our business development we have reached a time when this subject becomes of very much more importance and very much more essential than it has been in past years.

Whereas previously we came in contact directly in a business way with perhaps 5 or 10 or 20 per cent of the public, now our ambition at least, if not our realization as yet, is to have business relations with 100 per cent of the public we serve.

But some of us—perhaps many of us—have had too little ambition, have had too little realization of the possibilities of the establishment of really friendly relations with our consumers. Whatever the facts may be, the thought is projected at this convention that proper public relations between the companies and their consumers can be secured. We enter into competition with each other as to how rapidly and how completely we can bring about that situation in our respective territories.

Our job is to see how quickly we can be in the forefront of this movement rather than merely act as the followers to those who do lead.

The solution of the public relationship problem can perhaps be voiced in two thoughts—one hundred per cent service, one hundred per cent publicity. One hundred per cent service means service unaffected in any detrimental form at any point of the operations where improvement is practicable. One hundred per cent publicity does not mean merely advertising, but placing before the public and before the consumers all of the facts the knowledge of which will assist to promote friendly relations.

We Win Public Confidence and Esteem by Meriting It

BY ARTHUR WILLIAMS

Public relations to my mind is the most important question that is before our utilities today. I think it is greatly to our advantage as a great utility group to have the utility commissioners know us, and I think it is very important for us to know the men who are representing the public in these offices of public service control. I am convinced that antipathies, differences of opinion, disregard of regulation by fair men, all disappear when we get together in such meetings as this.

To my mind regulation has greatly strengthened the character of our relations with the public; it has, speaking from our own experience, greatly strengthened the confidence of the public in ourselves as utilities, but the thing that we need in holding office in public service control and regulation is that our commissioners shall not be subject to abuse and to the danger of being thrown out of office whenever they make a decision, whether it be for the utility or for the public, against the utility or against the public, which, in their judgment, is a fair decision.

To my mind, the tenure of office should be that which is given to our judges, and our public service commissioners should be so placed in their office that they shall be immune from the danger of removal because they give fair decisions based upon economic and not political conditions as they arise from time to time in their respective jurisdictions.

Our constant effort should be, day in and day out, to win the highest degree of public confidence and esteem by meriting it in every act of our company.

I just want to make this point where, I think, we have perhaps been negligent in the past. That is with reference to the training of men and women for public service. While we train our engineers and our accountants, we very often are somewhat haphazard in picking the men who represent us in the far more direct part of our business with the public. We ought to give just as much thought to the training of men and women of our companies that come in contact with the public as we give to the technical engineer or to the chief accountant.

The most priceless asset we can have as utilities is good and favorable public opinion, and too much attention cannot be given to its acquirement by our utilities.

Necessity of Good Public Relations*

Public Policy Committee Outlines Important Problems Confronting Industry and How Favorable Public Opinion Aids in Their Solution

THE broadest question of public import with which we have to deal is the attitude of the public toward the industry as expressed by public opinion. The importance of a favorable public opinion toward the industry must be indelibly impressed upon the minds of every one of its employees.

ALL INTERESTS ARE IDENTICAL

The interests of the industry and the public are identical; namely, the best possible service at the lowest rate consistent with a high credit standing, for without the latter the industry cannot attract at low cost the money necessary to provide more service to meet the public demands.

The industry has invested in it today something more than five billions of dollars. It is estimated that during 1923 this will be increased to six billion dollars. If the present rate of growth of our sales of electric light and power continues, there will be invested in the industry in 1930, in order to take care of the business then, not less than fifteen billion dollars.

Therefore, we will have to raise for the next six calendar years an average of a billion and a half dollars per year.

The success we have had in inducing our customers themselves to become owners in our properties is of the greatest importance in the development of our industry and has materially increased the stability of the financial structures of the properties interested.

Companies selling preferred stocks to their customers should so plan that the proper proportion between the two classes of stock is maintained, so that the preferred dividend is earned at least one and one-half times.

SOLUTION OF COAL PROBLEM NECESSARY

The creation of a national commission fully empowered to get to the bottom of the troubles in the coal mining industry is the first serious attempt toward a solution of one of the most vital problems with which our industry has to contend. We have been disappointed that the cost of coal did not follow the downward trend of prices generally. The prices not only have been higher, but many of our operating companies have had to import large quantities of coal from England because of the curtailment of the American supply. Fortunately we have been able to introduce operating economies in our steam stations, and through a maximum use of equipment and facilities have overcome the handicap of higher-priced coal, and have given our customers service at the same, or at lower, rates. Statis-

*Abstract of report of public policy committee of N. E. L. A. delivered in New York, June 7, 1923.

tics gathered by the U. S. Bureau of Labor reveal the fact that during the past five years the average rate for electric service in every community from which the government obtains its data is less than the rate charged in 1914. This is in spite of the fact that the average monthly price of bituminous coal at the mine has increased from $1.14 a ton in 1914 to $4.36 a ton in January of this year. Nor does this tell the whole story; for increased freight rates on coal from mine to destination have added considerably to the cost of central station fuel.

It is hoped that some way of checking these ever recurrent strikes in the coal mining industry and in the transportation industry will be found by the constituted authorities without experimenting with government ownership of coal mines and railroads.

The development of large electric generating stations, serving wide areas, embracing many towns and communities, has very largely eliminated the local town plant and with it the question of municipal ownership. On the other hand, this very development and the next development of the interconnection of these systems by which one or more states may be served from one superpower system are given an opportunity for the advocates of state and government ownership to voice their ideas.

If it is at all possible to convert these unbelievers in private ownership and operation by furnishing infallible proofs of our competent initiative and efficiency, by all means let us do so.

WATER POWER DEVELOPMENT

The filing of a suit by New York State in the United States Supreme Court questioning the constitutionality of the water power act had the effect of retarding additional water power development and probably will continue to do so until the case is finally decided by the court. Notwithstanding this, more water power developments are under construction at the present time than at any other time in the nation's history.

While not all of the applications for water power permits are capable of immediate development, at least $750,000,000 is involved in projects now under permit.

There is a great deal which may be done in the hydro-electric field particularly in the direction of co-ordinating the operations of hydro-electric and steam central stations. Much more time may also profitably be spent in surveying and studying the hydro-electric resources of the several states.

It is our firm conviction that this work should be done by the electric light and power industry. Surveys of this kind have already been made by the industry in the Southern Appalachian region, in the Adirondack region, in the Pacific Northwest, and the Great Lake states. Similar surveys should cover the entire country, however, and the work of the numerous committees should be co-ordinated into a national survey.

RURAL SERVICE PROBLEM

Your association has gone into the matter of rural service this year more intimately than ever before, and many of its committees have been in close touch with farmers' organizations and worked in co-operation with them. Obviously, if people leave the farm those who remain must utilize more and more machinery, if the nation's output of foodstuffs is to keep pace with the rapidly growing population and the demands of other sections of the world for grain. The electric industry realizes its obligation to aid the farmer and stands willing to supply him with service whenever and wherever it is economical and feasible to do so.

There is no denying the fact that complete electric service on the farm brings with it great advantages, and as the systems of distribution spread out, more and more farms will come within the range of economic service. No engineering difficulties stand in the way. Every farm in the country could be reached, but in the present state of the art the cost of doing so would be so great that the rates which the farmer would have to pay for the service would be prohibitive.

In addition to the work which is now being done by our committees in co-operation with those representing farm organizations toward improving farm machinery, our engineers might also make a study of the situation with a view to determining the possibility of devising some less costly way of tapping high-tension transmission lines without jeopardizing the service on the rest of the system. While we want to do everything possible to improve service in rural communities and extend our lines to the individual farmer, we must be careful that overenthusiasm on our part does not raise in the breast of the farmer any false hopes with regard to electrical supply.

STATE REGULATION

While commission regulation of public utilities may be said to be in a state of flux, out of the wealth of opinions and decisions handed down by courts and commissions may be gleaned certain definite facts. The right of the state, within constitutional limitations and in the exercise of its police powers, to fix rates and regulate the character of public service is beyond question. Time and experience have shown that electric public utilities are absolutely essential and that good and adequate service at reasonable rates is a matter of first importance to the community.

The business in which we are engaged calls for a high degree of technical skill and experience coupled with practical business knowledge and practical understanding of the law of economics. To bestow the full benefits of our specialized knowledge on the community we need its moral and financial support. The public service commissions are an aid to this end. They act as impartial judges of our acts, pass on our service and, in a sense, vouch for the integrity of our securities. This being the case we should insist on commissioners of high caliber and then assist them by doing all we can toward their being supported by a sound public opinion. With commissions composed of men of this type our future is safe. Their decisions will be based not on prejudice but on reason born of their study and education in our industry with its resultant understanding.

CO-OPERATIVE EFFORT NECESSARY

The National Public Relations Section's work covers co-operation with educational institutions toward the establishments of courses in utility administration; the education of our men and women employees in the fundamental problems of our industry and a proper understanding of its interrelation with the public; the organization of public utility information committees in the various states; the establishment of speakers' bureaus in the geographic divisions; a closer co-operation between our association and the different classes of financial institutions; the development of good will

advertising toward the industry by the manufacturers and the compilation of a proposed uniform regulatory law.

It is regrettable, however, that one of the greatest difficulties that this section has had to contend with is the apparent indifference of some of the operators to the very important work which the section is doing.

Your association, your public policy committee, your Public Relations Section cannot by themselves make for the industry the necessary impression on public opinion. They can only blaze the way. The individuals of the industry must make and keep that way permanent. This cannot be accomplished without the interest and enthusiasm of the executives themselves. It is their duty to see that the importance of a favorable local attitude toward their particular companies and a sympathetic national public opinion toward the industry are appreciated and fostered by every member of their organization.

In companies large enough to support them there should be one official who should give all his time and efforts to this work. In the smaller companies the executive must do it himself. In every company it must be done.

As a general proposition, the public is fair in its conclusions, provided it has the data and facts on which properly to base those conclusions. Let us be more alive to our duty by seeing that these facts are common knowledge. Let us bring to the public a realization of the fact that it really has the greatest interest in the success of the electric light and power industry. We have nothing to hide.

We are engaged in supplying a great essential service that is doing as much as, if not more than, any other agency in the development of the nation. What our industry has achieved in the past, though much, is small compared with what it can achieve in the future with the aid of an enlightened and favorable public opinion based upon mutual trust and upon mutual and comprehensive understanding.

Power Plant Practices Undergoing Change

Prime Movers Committee Finds That Higher Pressures, Stage Bleeding, Reheating During Expansion, Air Preheating, De-aeration, Powdered Fuel and Diesel Engines Figure Most in New Activities

IN GENERAL, the central-station industry is now actively considering higher pressures and temperatures, stage heating of feed water and reheating during expansion. Some companies are installing equipment of types considered quite distant not many months ago. However, many problems still remain unsolved, and there is a diversity of opinion with respect to the proper and best methods of utilizing higher pressures and temperatures.

Plants are now being considered with operating pressures from 400 lb. up to 550 lb. at the boiler. In one case boilers are being provided for 650-lb. pressure, but the turbines will be operated at 550 lb. The steam temperatures adopted in these plants range from 650 deg. to 750 deg. F.

According to information received by the prime movers committee of the N. E. L. A., of which C. F. Hirshfeld is chairman, many engineers feel that the adoption of pressures as high as 550 lb. at the present time represents too long a step into the unknown and that the advance to such pressures should be made slowly and conservatively. On the other hand, they agree that it would certainly be an error in judgment to adopt 200 lb. or 250 lb. for new work without giving thorough consideration to the possibilities latent in higher pressures.

The effect upon pressure loss of the design of piping, and particularly the design of valves and fittings, should have serious consideration before final decision. Instances are on record in which slight modifications in such parts reduced loss through them to values between one-tenth and one-half of those previously considered normal.

The increasing use of high-temperature steam has served to focus attention on steam-pipe insulating covering. Practice differs greatly, as all of the materials sold for this work seem to be in extensive use. However, 85 per cent magnesia is still the predominant material.

Expansion bends or offsets seem to be in almost universal use for high-pressure lines. These are reported as giving entire satisfaction except for leakage at flange joints in some cases, but this trouble appears to be the result of improper design rather than an inherent weakness of this type of joint.

Ash and Coal Handling Practice

Statistical data on methods of handling coal and ash have been compiled from forty-one representative central stations. Of these, thirty-six received coal by direct railroad shipment and thirteen by water. Seasonal outdoor storage is provided at eighteen out of forty-one plants. Several mine-mouth plants are included in the eighteen. At twenty-eight plants locomotive cranes are provided for unloading or handling coal, while sixteen report bridge-crane facilities. Fifteen of the plants dump ashes direct into cars, while only seven dump direct into conveyors. The ash is transported from the plants by railroad cars in ten cases, and in ten others it is disposed of by dumping into hollows for grading, being transported by trucks, industrial cars, aërial trams and hydraulic sluices. In four cases the ash is disposed of by transportation in barges.

The trend is more and more toward the use of motor-driven auxiliaries, with in most cases some arrangement for insuring a continuous supply of power to those auxiliaries commonly classified as essential. The proper control of motor-driven boiler-feed pumps is causing a number of operators some concern. Numerous curves are embodied in the report of the prime movers committee, showing the variations in thermal performance resulting from different bleeder and auxiliary arrangements with and without economizers. The economical

feed-water temperature when economizers are used with stage heating appears to be higher than one would expect from experience in the older type of plants. The increasing use of deaërating equipment makes it necessary to consider the effects which such devices may have on heat balance.

Experience reported by a number of companies indicates that jet condensers can be used as heaters and at the same time operated so as to hold the oxygen concentration to values between 0.10 cu.cm. and 0.25 cu.cm. per liter. When very low oxygen concentration is desired, the concentrate and feed water must be handled in such a way that contact with the air is virtually eliminated. This may be done by maintaining a completely closed system except for a steam-sealed surge tank.

The closed heater has been used extensively for the higher temperature ranges. It is now coming into use for bleeder heater, as it offers decided advantages for such work. If provision is made for draining off condensate as rapidly as it forms, bleeder lines can be connected directly with the interior of heaters without check or non-return valves.

Some designers are now providing for the recovery in the condensate of heat in generator cooling air, in turbine lubricating oil and in transformer oil. The effect of make-up evaporators on heat balance is considered at length in the report, and numerous methods of connecting such evaporators into the system are given, together with indications of the effect on heat balance.

Close co-operation between manufacturers and users of turbines has resulted in considerable improvement in ability to meet severe requirements as to continuity of service and in gradual elimination of many of the minor defects which have been experienced in the past. Performance records of seventy-four large turbine units installed in twenty-seven power houses are given in the report for the year 1922. The outages of these machines have been analyzed very completely and classified according to power.

GENERAL USE OF BLEEDER STEAM

The very general use of bleeder heating of feed water in two or more stages is one of the notable movements of the year. The construction of a turbine to operate with steam at a pressure of 1,000 lb. to 1,200 lb. and to exhaust through a preheater into the high-pressure mains of an existing station is another development of the past year.

Control of the quantity of circulating water and various methods for effecting such control are discussed. It is shown that the use of two constant-speed pumps is only a partial solution in most cases and that variable-speed pumps make possible more economical control. The results of tests are included. The maximum permissible siphon is discussed, and records are given showing that one installation operates satisfactorily with a siphon of 32.5 ft. of water. Experience seems to indicate the desirability of a separate tank for hurling water with proper provision for cooling and make-up as the safest arrangement. Two cases are reported in which salt water used in hurling water has found its way into the condensate and ultimately into the boilers.

Rolling in condenser tubes at one end is considered entirely satisfactory by several companies, but others claim that it requires more time than it does to pack tubes in the ordinary way. Besides, the tubes have a very short life, and the removal of a tube is a more difficult job. The committee declares that it would be highly desirable that the users of condenser tubes should agree upon a single satisfactory specification for Admiralty metal tubes; tentative specifications have been prepared by the American Society for Testing Materials.

TABLE I—SUMMARY OF OPERATING RECORD OF SEVENTY-FOUR TURBINE UNITS (1922)

		Percentage of Period-Hours
Installed turbine unit capacity, kw	2,068,000	.....
Total period-hours reviewed	642,902	100.0
Kw.-hr. generated—total	8,885,504,000	.....
Service hours demanded	481,093	74.8
Service hours operated	437,902	68.1
Idle hours	205,000	31.9
Unit service demand factor, per cent	.....	74.8
Service demand availability factor, per cent	.....	91.0
Capacity factor, per cent	.....	48.1
Output factor, per cent	.....	70.6
Service hours factor, per cent	.....	68.1
Maximum possible service hours factor, per cent	.....	84.5
STEAM TURBINE		
Total hours of repair and maintenance	51,136	7.9
Steam casing and joints	1,141	2.23
Governors	618	1.208
Control gear	615	1.202
Packings	1,800	3.520
Nozzles	140	0.275
Shaft and coupling	115	0.225
Wheels or spindle	20,113	39.33
Buckets or blading	2,485	4.86
Vibration	5,565	10.88
Bearings	1,824	3.57
Lubrication system	901	1.76
Cleaning oil system	1,663	3.26
General inspection and overhaul	14,156	27.68
Repairs during service demand	25,176	49.2
GENERATOR		
Total hours of repair and maintenance	20,506	3.1
Vibration	465	2.26
Oil leakage	44	0.215
Armature core	1,050	5.13
Armature winding	9,771	47.6
Field winding	5,838	28.4
Collector rings	423	2.06
Exciter	46	0.225
Fans and ventilation	693	3.38
Inspection and cleaning	2,176	10.5
Repairs during service demand	10,430	50.7
CONDENSER		
Total hours of repair and maintenance	16,369	2.5
Leakage	2,071	12.65
Cleaning	9,154	55.92
Tubes	2,386	14.58
Shell	13	0.08
Circulating pumps	1,692	10.34
Hot-well pumps	262	1.60
Air pumps	454	2.77
Miscellaneous	337	2.06
Repairs during service demand	3,694	22.5
OTHER CAUSES		
Total hours of repair and maintenance	11,448	1.8
General piping	1,201	10.5
Plant electrical	1,720	15.0
Outside electrical	70	0.6
Miscellaneous	8,457	73.9
Repairs during service demand	3,086	26.9
IDLE		
Reserve ready for immediate starting	105,248	16.6

The first preheater is being installed in this country. It is designed to raise the air temperature 100 deg. F. at maximum load at the expense of heat contained in the flue gases leaving the economizer.

A study of arches over chain-grate stokers shows that no general agreement on details of design, size, shape, location, etc., is yet possible. Available life seems to vary from a few weeks to periods longer than one year, and in one instance a life varying between one week and five years is reported for arches of supposedly the same construction, operating in the same plant under what are supposed to be like conditions. Numerous methods of protecting side walls by air cooling and water cooling are being used; in a few cases the arch and its supporting metal are being cooled by air.

A number of plants are using stoker regulators with entirely successful results.

The increasing use of inclined baffles in horizontal

TABLE II—RESULTS OF OPERATION OF DIESEL ENGINES
(Data for three-year period ended Dec. 31, 1922)

STATION	A	B	C	D	E
Number, Size and Kind of Diesel Units	Three 500-Hp. M. & S. Diesels	Four 225-Hp. B. & S. Diesels One 500-Hp. M. & S. Diesels* One 250-Hp. Primm Semi-Diesel†	Three 225-Hp. B. & S. Diesels	One 600-Hp. M. & S. Diesels Two 225-Hp. B. & S. Diesels One 170-Hp. B. & S. Diesels	One 500-Hp. M. & S. Diesel
Total Diesel plant capacity, kw.	930	‡750–910	450	735	310
Station load factor, per cent	73.7	33.25	29.50	33.0	69.4
Lb. fuel per kw.-hr. output	0.675	0.925	0.985	0.804	0.741
B.t.u. per kw.-hr. output	12,820	17,580	18,720	15,430	14,090
Lubricants in gal. per kw.-hr. output	0.00098	0.00240	0.00232	0.00184	0.00092
Engine maintenance cost per kw.-hr. output, mills	3.23	6.91	9.05	7.95	4.60
Fuel cost per kw.-hr. output, mills	3.98	5.86	5.90	5.75	4.51
Lubricant costs per kw.-hr. output, mills	0.410	1.79	1.21	1.08	0.640
Total maintenance costs per kw.-hr. output, mills	3.39	7.40	10.01	8.65	4.94
Miscellaneous supplies per kw.-hr. output, mills	0.492	1.00	0.971	0.699	0.726
Labor cost per kw.-hr. output, mills	2.17	4.40	5.27	3.65	2.43
Production cost per kw.-hr. output, mills	10.442	20.45	23.361	19.829	13.246
Number of employees (average)	6	7	3	5	3

*Installed 1922. † Not used since 1920. ‡ Increased due to new unit.
Note.—The Diesel engines at the stations represented in the above tabulation vary in age from eight to seventeen years. All of these engines have been giving continual service with the exception of the time lost for regular maintenance and repair periods.

tubular boilers has stimulated development of many different varieties. Baffles of the monolithic variety and baffles consisting of monolithic material reinforced with tile have given trouble in some cases. The indications are that the use of Portland cement makes them more resistant to shock and does not reduce the refractory qualities to an undesirable extent.

The experiences of one company in protecting and repairing furnace walls by means of a cement gun indicate that the life of such walls can be greatly increased at very small cost.

Results obtained by various methods of treating feed water have been obtained from thirty-six operating companies, and these are tabulated in the committee's report for ready reference. In general, each company has been favorable to the method used, indicating that the conditions have been improved by the treatment adopted.

DEAËRATORS STOP CORROSION

Results of tests made on one installation of deaërators indicate that with condensate leaving the main condensers with zero oxygen contents the water drawn from open heaters at temperatures in the neighborhood of 180 deg. F. contains 0.75 cu.cm. to 1.4 cu.cm. of oxygen per liter. This material leaves the deaërators at temperatures about 10 deg. lower and contains no oxygen. In this plant the use of deaërators has stopped corrosion of steel-tube economizers, which was previously very rapid and serious.

General satisfaction is expressed with the use of evaporators for preparing make-up water. Attention is called to the fact that leaky condensers may largely vitiate the results otherwise obtainable. When the make-up water contains corrosive elements it may be necessary to treat it chemically before admitting it to the evaporators.

Very satisfactory results have been obtained by two companies with the Permutit system. One company reduced its tube replacement expense from $2,600 a year to zero and reduced the boiler-cleaning expense to one-third of its former value.

Tentative specifications for coal are presented by the committee this year. These have been drafted with the idea of making them practical—that is, protective to the purchaser and still acceptable to the producer.

Many trial installations of pulverized-fuel firing have been made during the past year. This method of firing has been adopted by several large plants now being designed or under construction. Much experience remains to be obtained in fuel preparation and transportation, as well as in actual combustion. The present tendency is toward the installation of radiant-type superheaters for powdered fuel furnaces, arranging them in series with the convection superheaters already installed.

As the result of elaborate tests, the Stirling boilers have been modified in the arrangement of heating surface and baffling so as to give reduced flue-gas temperature. This design makes it possible to obtain a greater amount of heating surface within given column centers than with the older design.

Of 500 feed-water regulators reported on, 85 per cent are said to be reliable.

Statements received from two plants, one using integral economizers and the other steel-tube economizers above the boiler, indicate that the feed water must be virtually free from dissolved oxygen if internal corrosion is to be prevented.

MECHANICAL OIL BURNERS NOT FULLY APPRAISED

Experiments are still being made with oil burners of different kinds with different furnace arrangements. The important features appear to be furnace volume and method of introducing air. Existing burners of the steam-atomizing type have a working range from 40 per cent to about 250 per cent of boiler rating, so that burners must be cut out to carry less than 40 per cent load. Greater flexibility is desirable. Mechanical burners are not yet fully appraised, but they possess recognized advantages with respect to efficiency and maintenance.

Brief accounts are given of one case in which refinery residue is burned successfully and of another in which undehydrated oil gas tar is being used. Research is still very active concerning the distillation products of coal, and semi-commercial trial of different processes continues.

Owing to the catalytic action of certain babbitts on lubricating oil, care should be used in the selection of the babbitt. Of the two forms of sludge formed, one can be removed with relative ease, whereas the other is very difficult of removal. Despite extensive development of oil-purifying equipment of various sorts, there is yet no completely successful device.

Attention is called to the fact that it is better to install too few instruments than to install more than can properly be taken care of and used to advantage. Consequently, the committee has listed the boiler-room and turbine-room instruments which it considers are essential and in the order of importance or preference.

Gas engines of 200 hp. and under are extensively used in the smaller stations in which limited capital favors the lower first costs in comparison with Diesel engines. When such limitations do not exist and when a reliable and uniform supply of cheap gas is not available, the

Diesel engine is more often used because of its greater economy. Actual operating costs are given for gas-engine and Diesel-engine plants. Figures are also given to show installed costs on a kilowatt capacity basis. Attention is called to the extreme importance of proper maintenance in the case of Diesel engines and to the fallacy of predicating operating costs upon periods which are not of sufficient length to span a complete cycle of maintenance. The committee pointed out in its report that there is apparently a very marked tendency toward the increased use of Diesel engines, not only in the small plants but also in plants of considerable total capacity, consisting of units of relatively large size.

Customer Ownership a Safeguard Against Communism

Britton, Egan, Hall and Forbes Champion Cultivation of Human Relationship in Utility Operation and Development

A SYMPOSIUM notable in the annals of the association was held upon customer ownership at the Thursday session of the committee of that name. John A. Britton, vice-president Pacific Gas & Electric Company, San Francisco; B. C. Forbes, editor *Forbes Magazine*, New York; E. K. Hall, vice-president American Telephone & Telegraph Company, New York, and Louis H. Egan, president Union Electric Light & Power Company, St. Louis, Mo., addressed a large and enthusiastic audience upon the development and prospects of customer and employee ownership, emphasizing the opportunities now before the industry in this field. Abstracts of these addresses follow.

Customer Ownership Spells Salvation of the Industry

BY JOHN A. BRITTON
Vice-President Pacific Gas & Electric Company, San Francisco, Cal.

TODAY the United States is facing a menace through radicalism and all the other isms to which a nation like ours is heir, a menace greater in my judgment than a cruel war. Through insidious propaganda the public is being taught to have no respect for private property, whether owned individually or whether in the hands of corporations. The more you get that man or that woman to hold the little slip of paper that represents a certain interest in your affairs, and the more he knows that the protection of that slip of paper means the safeguarding of property and income to him, the greater seed you are sowing. Involved in this is the welfare of this great and glorious country of ours that must be preserved along the lines upon which our forefathers built and which no one must be allowed to tear down.

On June 1, 1914, a circular was sent out by the Pacific Gas & Electric Company asking employees to participate in the purchase of preferred stock about to be offered on the market. There was a very ready response. That was the first date in the United States that any public service corporation offered its holdings of stock to its employees or to the public. Within a month an offering was made to the public, and we have continued ever since and very successfully. In 1922 our sales were more than $10,000,000 of preferred stock, sold over our counter without much effort, without any sales organization, and generally through the spirit of our employees, who became, unconsciously perhaps, the salesmen of our preferred stock, because they had up to that time imbibed the spirit that was abroad in the land that they should be partners through investments in the enterprises for which they worked.

I think down deep in the heart of every man and woman in the United States, whether he or she be of foreign birth or otherwise, lies dormant that love of possessing something, else we would not be, as we are, a nation of home owners. It is only a step from the desire to own a home to an investment that will insure the protection of those near and dear to you. That underlying sentiment needs only to be awakened by a general popular knowledge that the investment they are going to make is sound and desirable. It appeals with more than ordinary force if it is of local character.

In the early years before regulation, company after company in this country paid for extensions out of the profits arising from their rates. Unfortunately that payment out of earnings by the maintenance of high rates has kept us in boiling hot water. If the men in the industry at that time had had common sense enough to have pursued the method of financing that is pursued today, and if a part at least of that surplus earning devoted to the extensions of capital had been devoted to the reduction of rates, less would be heard today of the odium that still, I am sorry to say, attaches to some of the public service corporations.

Then the companies got into the hands of speculators, more or less, and then that narrowed down to certain circles of control, and we were facing a very serious era in public service corporation work such as ours before this consumer ownership came into being. The general sentiment of the press throughout the United States was decidedly against public service corporations and their policies.

Now you are leading up to more perfect and positive public relations. I don't care whether a consumer of yours is a stockholder or not, if the treatment of him by the employees of the company is not 100 per cent perfect, he disregards his small holdings of stock, and becomes not a booster but an opponent of the company.

I realize fully as well as any man here what it means to have back of you, however, an army of stockholders who have become imbued with the policies of your company and with the fact that it is the part of every

one having an ownership in the company to stand behind the protection of private property.

Let me tell you what it means to have those stockholders who believe in that preservation of private property as well as the nation as a whole. We did have in 1922 a war in California against that type and kind of destructive work that would tear down anything builded in honor and on principle. We had a fight there, and if they had won out, it would have threatened with destruction every public utility throughout the United States—would have toppled from its foundations the edifice that we men in the industry have been building up for more than a century.

That was the menace of that water and power act. Had California put its stamp of approval upon statewide ownership, it would have crept on its insidious and slimy way all over this great nation of ours, and I think we of California did the nation a service. We didn't fight the battle alone. We don't take that credit to ourselves. The N. E. L. A., I am glad to say, under its great leadership, was of inestimable benefit to us in the accomplishment of our purpose to keep our state clean from those sorts of reptiles.

How did we do it? We had in all the public service corporations of that state not less than 100,000 stockholders.

Seven Voters Per Stockholder

There were at least 400,000 citizens of the state of California who went to the polls that day and voted against the proposition and, aided and abetted by others who on general principles were opposed to it, we rolled up a vote there of nearly 700,000 against to a little over 200,000 in its favor.

However, while we put our foot on the neck of that dragon for the time, he still spits fire. He is still alive. He has more lives than the proverbial cat and we have to face him again and his cohorts in 1924, but strengthened by that vote, strengthened by the increase in consumer ownership, I feel certain that the result will be better for us than it was last year.

We in California were pioneers again on massed stockholders' meetings and I commend our policy in this respect to every executive. We determined that we had a message for our stockholders, as we saw their numbers grow in importance and influence in the communities. Incidentally it is a big mistake for men in the public utility game, where state regulation is supposed to take care of them, to ignore entirely local conditions and influences, as unfortunately sometimes is the case.

We went out and organized stockholders' meetings at different points in our territory. The executives of the Pacific Gas & Electric Company traveled for nearly four months to the distant points of the system—and the Pacific Gas & Electric Company covers an area of 42,000 square miles. We went to the little hamlets of only three or four hundred people and to the cities of 500,000. We addressed something like twenty-five meetings and we gathered together between eight and ten thousand of our stockholders. We told them of our troubles, we told them of the part that they had to play in solving our troubles. We laid our cards on the table and told them what property they possessed and how it had been acquired and what it was worth to them. It was a good story. We illustrated it during the evening with moving pictures and lantern slides of the more prominent parts of our system.

I commend to you all to do that sort of thing. Go and see your stockholders and talk to them. Do not expect them to come in to your presence. There is a chilliness on the ordinary individual who comes in to our office. I venture to say that he does not know John A. Britton except as an imaginary person sitting behind a mahogany desk, clothed in awe and majesty, and that he has to go through four or five doors and send his card in and is received with ice-water glances and thrown out as soon as possible, and he hesitates to approach the executive.

I wish to Heaven, gentlemen, that the executives of the companies and their employees as well could be put upon the same plane of understanding upon what part they play with their consumers and the public as that of the grocery man who meets you smilingly at the counter and hands you out what you want.

After all, it is the human element. If I don't accomplish anything else this afternoon than to have put into the minds of you people here that you must in your attitude and conduct toward those you are serving treat them as you yourselves would like to be treated, I will be satisfied. It is only the Golden Rule. And if you do that, the mistakes that are around the morning sun of your success are going to fade away as sure as God made heaven and the earth.

Annual Reports by Radio

W. E. Creed, president of the Pacific Gas & Electric Company, radioed out of San Francisco his annual message on the day of the annual meeting of the stockholders, listened to I don't know by how many thousands of people. I thought it a wonderful accomplishment. We know he was heard in Oregon, in Idaho, in Utah, in New Mexico, and all over California.

Again we called in our stockholders that night in every little hamlet and village, and where they didn't have a radio set we provided it for them; our division and district managers gathered them in to halls in sections in our territory, and there Mr. Creed's speech was delivered again to our stockholders and I think there were more than ten thousand in attendance.

All that I have said has tended toward the encouragement of consumer ownership. We must keep our house clean and as much above suspicion as was Caesar's wife. We owe it to ourselves, to this great industry of ours, and we owe it as well to that nation that we serve and that we are proud to serve!

Opportunity and Responsibility of Customer Ownership

By B. C. Forbes
Editor *Forbes Magazine*, New York

CUSTOMER ownership as a policy in the electric light and power industry can do more than any other branch of the management for the well-being and the prosperity of this nation.

Suppose we ask "What is the outlook in our own democracy, in our own commonwealth, in relation to this matter of getting ahead of the game?"

In one word, the outlook is very inspiring. In thrifty France the savings deposits of the people amount to less than one billion dollars. In frugal England the savings deposits amount to a billion and a half dollars; in our own country the savings deposits exceed eighteen and one-half billion dollars.

I gather that in the last eight years your companies

have attracted 425,000 customers alone as stockholders, and that you are confident that within three years you will have 1,000,000 customer partners.

When you consider that one electric company alone recently, through one offering of securities, was able to attract over 40,000 customers and 16,500 employees, then I think you ought to have no difficulty whatsoever in more than reaching this goal of 1,000,000 inside of three years.

I am interested in the customer ownership movement; I was sufficiently interested to put up through *Forbes Magazine* $1,000 in prizes for the best letters, the best articles on the benefits of customer ownership.

I think that, through the co-operation of you men in the industry, at least something has been accomplished to spread information and widen interest in this movement by means of this contest, for one thing. Over 2,000,000 lines of newspaper advertising have been published throughout the country in connection with this subject, this contest. Manuscripts poured in from every state in the Union and from all classes.

Next to being able to deliver the goods, the most powerful thing in this world is printers' ink. By that I mean letting the world know, being able to convince the world that you are able to deliver the right goods at the right price.

I think perhaps it might help your industry a little bit if we were to get together the first three or four prize winners in a little booklet and get them out at a purely nominal price per thousand, so that you could distribute them to the people in your territory.

CUSTOMER OWNERSHIP SLOGANS

If I were to presume to offer one suggestion in connection with the furtherance of the customer ownership movement, one suggestion that might help to attract more buyers of your securities, it would be that you play up the home appeal, using such slogans as "Keep the saved dollar at home"; "Keep the dividends at home"; "Boom home trade"; "Boom the home community."

The simpler the arguments, the closer they come to the pocket, to the life of the ordinary people, the better.

Advantages and privileges always bring increased responsibilities. The growth of customer ownership means increased, seriously increased, responsibilities. If your organization hasn't already (and I don't know whether it has) some sort of viligance committee, I would suggest that it seriously consider appointing one, to look after, to keep an eye on the securities offered for customer and for public consumption. Nothing would more fatally hurt this whole important, vital movement than a few bad, a few unsafe, a few unworthy issues, widely distributed in local communities.

I do not know that it is necessary to mention it, but I believe that equally important with customer ownership is employee ownership. After all, the working classes can roll up more votes on election day than any other class in the whole country. It is, therefore, extremely important to earn co-operation and the loyalty and good will of your workers, through inducing them to become stock owners upon as generous terms as you can afford to provide. Then your worker feels that "I am not working simply for an impersonal corporation; I am working for the benefit not only of myself but my next-door stock-owning neighbor, my stock-owning friends and the whole community."

He feels that he has risen to a new stature in the scheme of things. I believe that whether we are going to drift, to move toward state and municipal ownership of public utilities, will be determined very largely, if not wholly, by how this dual movement of employee ownership and customer ownership succeeds or fails.

If you prove that you have ability enough to develop this movement wisely and broadly, then I believe that when the test comes the results will usually, if not always, be very much the same as the result was out in California last November, when by an overwhelming majority the people there voted against state ownership of the hydro-electric companies.

A NATION OF INVESTORS

I would ask all you executives to feel that you are playing an infinitely larger part in the scheme of things than merely being out to make money for yourselves and money for your companies, important and vital though that is. Through customer and employee ownership, you have the opportunity and the responsibility of doing something valuable to transform America into a nation of investors. If you succeed in a large way in transforming America into a nation of investors, you will thereby succeed in bringing about a happier, a more contented, a more prosperous people.

Capitalizing Owner-Customer Contacts

BY E. K. HALL
Vice-President American Telephone & Telegraph Company, New York

I HOPE that in this customer-ownership proposition all of us in the utility business will not feel that our work is done when our customers have become stockholders. If we will all use that contact as an opportunity to follow that up with information about the business, about the problems of the business and about the principles of public utilities as related to the general public and to government, it will help a great deal.

PUBLIC UNDERSTANDING NEEDED

The one thing we need more than any other one thing is to have the public understand what we are trying to do for them, that we have no other job on earth but to furnish them service, and to set up a relationship with them so that they will be free to let us know just how they want that service. If all the utilities can get on that basis with the public it is going to be a whole lot better for us and infinitely better for the public themselves.

If we are going to interpret this public utility business to the public, then it has got to be done, not by the management, not by a few people at the top, but by the whole outfit. They have got to know the principles and the policies. They are the ones who can bring the public to a sympathetic understanding with the utilities as we executives never can begin to do.

This whole thing anyway, as we see it, is nothing but an attitude of mind. What is the attitude of mind of a given man toward a public utility company? Does he think that the public utility company is in business simply to make a lot of money? If that is his attitude of mind, he has it all wrong. The public utility man can't make a lot of money. The public utility is limited to a

fair return on the money that has gone into the business. That is all we can make. Until somebody changes the attitude of mind of that particular person, he has never got us right and we are never going to get him right. We can't get along right with him while he thinks in that way.

It is exactly the same way with the gang that is doing the job in the field. What is their attitude toward the company they are working for? Do they consider it simply a sort of an unknown organization to them where they come once a week and get their pay check, or do they really realize what it is—a great big combination of capital and muscle and brains and pep that are welded together in a big organization to give the public what it is absolutely essential for it to have—public service?

If the gang, if the crew in the field are a part of it, if they feel they "really belong," if they feel they have an opportunity to talk these things over and learn something about the policies of the company and the financing of the company and have a stake in keeping the company sound and successful, they can interpret the company infinitely better than they can if they don't have this feeling.

We don't need to argue that customer ownership is one of the best things that has ever happened to the public utility, not only in financial set-ups, but in their spirit toward the whole job; but here is the thing that perhaps we do not always keep in mind and perhaps we have not given enough thought to, and that is that never is any public utility going to go before the small investors of the country and sell them poor securities. Mr. Forbes said a good many wise things, but he didn't say any wiser thing than, that just a few issues of bad public utility securities are going to hurt us all and make the small investor lose confidence in the whole proposition.

Sound Securities Aid Public Welfare

But assuming that every one of us will see to it that nothing but gilt-edge, first-class securities is sold to the small investors, then we are rendering, besides helping ourselves as we see it, a great service to the individual who buys our good securities. Probably 50 per cent of all the inhabitants of the United States have no idea today how to invest money, and very little opportunity to invest money.

In Texas we found a pretty good-sized town which would have to go further than from New York to Chicago to get to a first-class investment brokerage concern. Of course, the answer is, "Why, they can always go to their local banks." But they are bank-shy. It is very different for a citizen of such a community to come and talk with the people in his own town, his own public utility people.

Losses to Frauds Could Nearly Finance Utilities

The Better Business Organization made an estimate not long ago that $700,000,000 a year in the United States was turned over to fraudulent promoters. It would not take very much more than that to keep building the public utilities of the United States, their extensions for more or less of an indefinite time in the future. If the money of the people who are being buncoed, whose money is being stolen from them, could be turned into public utilities, which, under government regulation, are the soundest securities next to government securities, practically, in the country, we would be doing the individual investor a tremendous favor and a great good.

We must be absolutely sure that no public utility securities that aren't good are sold to investors. It would be a bad thing for the social order in this country of ours if we destroyed the confidence of the small investor. If this first little experiment in saving and investing turns out wrong, he will lose confidence in the whole plan.

All taxes increased tremendously during and since the war and with no indication of a let-up. That means just one thing, that the source of supply for capital, for building and extending these public utilities is, to quite a large extent and to a very serious extent, impaired and yet the demand for the growth of the utilities is bigger than ever.

Selling to Society in Cross-Section

Business is good. We have a prosperous country. The national income is about $60,000,000,000. Sixty per cent of that goes to people of less than $2,000 a year income, and 52 per cent of it goes to the wage earners. Those are the people who are going to buy these public utility stocks in customer ownership. It is not going to the rich people, not to the big investment concerns, but it is going to a cross-section of society which is the best place to have these things owned.

A list of the people who came in partnership with one of our companies recently in one of these customer-ownership stock distributions included lawyers, teachers, clergymen, government employees, newspaper men, manufacturers, bankers, barbers, blacksmiths, boilermakers, butchers, carpenters, chauffeurs, cooks, mechanics, firemen, waiters, shoemakers, housemaids, housewives, farmers. Housewives were at the head of the list.

We have a much stronger situation already in the distribution of wealth and saving in this country than abroad, but we should not be satisfied with what we have got. I mean the country should not. The more we can extend that, the safer this country is and the safer our institutions are.

All these countries in Europe are struggling along with poor public service. When they have poor public service they have not laid the foundation of sound, permanent and active business and industry. They have tried to develop it through government ownership. Through customer ownership we see what a wonderfully better thing we have! The whole people are going to own these utilities. In the next twenty years these securities are going to be even more widely distributed. That will bring about a better understanding between the public and the people, a very much safer situation for the country at large, infinitely better public service, and it will be better for the American nation as a whole.

If we carry out customer ownership intelligently and fairly, conservatively and soundly, we are guaranteeing the success in the future of these public utilities pretty nearly. We are doing a wonderful thing for the industry. We are doing a very much needed and very magnificent service to the individual investor, the small saver who wants to invest his money safely, and by distributing the ownership of all these great service companies throughout the country, we are doing the nation itself perhaps the greatest service that we can render to it.

Broader Financing for Customer Ownership

BY LOUIS H. EGAN
President Union Electric Light & Power Company,
St. Louis, Mo.

Of the $180,000,000 which has been sold during the past year and which is being exceeded this year, there has been $145,600,000 of it sold in the form of preferred stock. Why preferred stock? Going back to Mr. Hall's suggestion that the securities should be gilt-edged and first-class only that you sell to your customers, it is obvious that you can't sell bonds that way if you continue to sell them on the basis that you sold them in the past, namely, in large blocks as required.

If, however, you try to sell the common stock, you are getting very close to the point, unless your company is in a very satisfactory condition, unless it has a long record of dividend years on common stock, you are getting to the point where it is well to adopt something in between, so we came to preferred stock and started out on 7 per cent preferred stock because it was a convenient sum, it was about the return that we felt the stock should bring at that time.

Now, if we change that attitude, we must be careful in which direction we change it. As the business expands and as our securities become more and more secure, we will, of course, be able to sell common stocks with more assurance than we ever have before, but there are some difficulties about selling common stocks that are not inherent in the sale of preferred stock. The time is short, it is impossible to go into all of those, but they are there. It is not always as satisfactory, and yet if you are selling stock to customers and to others on the basis that you want them to work with you, when you are caught where the hair is short, then you ought to sell them common stock, and there is no question about it at all. That is the first stock that would feel any unfair advantage that might be taken of you. Your preferred stock would not be affected until some time thereafter, but your common would. That may be the next step as the business becomes more stable. The possibilities of it are crystallized in the minds of your purchasing public; it may be that the common stock is what you should sell.

IDEAL SECURITY SET-UP

The ideal financial set-up of the public utility, as we view it today, is that approximately two-thirds of your investment is in the form of bonds and one-third of it is in the form of stock. If you want to get your money on the cheap basis, you probably divide your stock on the basis of one-sixth of it in common stock and one-sixth of it in preferred stock. How much money does each customer represent in your business? In your community it is approximately $300. Therefore, for each new customer that is coming into your business today it is necessary to provide $300 of investment. One-sixth of $300 is $50, and that is all the money that you will be able to get in the form of the sale of preferred stock, if you follow this very definite financial set-up that we are all more or less following today.

Now, on the basis of $50 to that customer, what chance have you of selling him in the future? In Missouri we have approximately $600 to each holder of our preferred stock. It has been very easy; all things considered, it has not been difficult at all. Six hundred dollars gives you a possibility if you maintain that ratio of only selling one in each twelve of your new customers. Is that difficult? Obviously not. Many of us have already reached that point, starting before the war and working up through these years when it was not easy always and when the government actually denied us the opportunity of selling, when 7 or even 8 per cent preferred stocks didn't have the very desirable ring that they have today.

We have then a comparatively easy future, if we are going to confine ourselves only to the sale of preferred stock, representing one-sixth of the investment that you have to provide for each customer. We look forward with confidence to our ability to do that. In fact, one of the reasons why the expanding companies in this industry have sold so much stock in the last few years is that they have so much to sell. We started from zero practically. We had had no past in that respect and so we have not only caught up but we are now exceeding the amount that is required, if we maintain this ratio of preferred, which is approximately what we are doing today.

We have worked up a selling force amounting to quite a considerable investment, not only the dollars and cents that we pay them, but the investment that we have made in educating them, just as you have in any employee, but even more than usual in the case of your securities salesman who came to you knowing nothing whatever probably about the business he was to undertake. Now, you have worked him up to the point where he knows all about your company, all about your future, as you have told it to him, all about your past as he has read it. He knows a great deal about the business, and yet when the month of May rolls around you are through for the year. It just won't do. You have got to sell something else. You have got the facilities to do it, you have got the clientele to sell it to, you have sold them what? Millions and millions of securities on which you have paid regularly dividends now for some years and with every prospect of a continuation of doing so.

MORE BONDS SHOULD BE SOLD

Why shouldn't you sell him something that pays 5½ per cent, as well as 6 per cent or 7 per cent or 8 per cent, or some other per cent? It even comes back to Mr. Hall's idea that it approximates something first-class and gilt-edged. Why shouldn't you sell him some of your bonds? Right away you say: "Well, these have to be sold in buying lots and it is difficult to do it, and the bond people would probably object and the bankers would, too"—and so they would, but the bankers and those investment bankers and those who handle preferred stocks, when you undertook to sell your preferred stocks, predicted only failure.

You will find today that when you begin to talk about the sale of bonds the same answer will come back to you, and yet it can be done. It is done here in this report to the extent of a few million dollars a year but with, however, a minimum of effort in that respect. It can be done in Missouri today; we are doing it in a very quiet, modest way, just to try it out to see what the reception is that they get, to find out what the people say, so that we may study for the future and devise the best forms of sales that we can, covering that. I think that is what we are all coming to in time.

When we talk to customers and to commissions and to anybody else about our business we should adopt a happy attitude toward it. We should be proud of its past and confident of its future and that will help you

to sell securities as much as anything I know. There are possibilities in the sales of these securities that we don't dream of today. I am satisfied about that. Just the method by which we will accomplish that I am not so sure of, but let's be happy about it and confident about it, and every time we talk about it don't let us let out a bleat such as the railroads of this country do today. The public here, I am sure, is sick and tired of hearing every railroad man who speaks publicly groan and moan about the way he is oppressed. He may be oppressed, but I don't think it helps him any to talk so much about it.

Renewal and Retirement Reserve

Purpose and Effect of Property Requirements—Properly Maintained Utilities Do Not "Depreciate"—Questionable Value of Life Tables—Function of Commissions

BY CARL D. JACKSON

Attorney-at-Law, Joint Counsellor for the National Electric Light Association and the American Gas Association
Formerly President of the National Association of Railway and Utilities Commissioners

THE question has been asked: "Has a depreciation reserve any other purpose than to provide a means of equalizing the effect of property retirements so that the disproportionate burden may not fall upon the operations of any one year?" The answer is in the words of Account 251 of the Uniform System of Accounts:

"The losses which this account is intended to cover are those incident to important retirements of buildings; of large sections of continuous structure, like gas mains, or of definitely identifiable units of plant or equipment, and the object of the account is that the burden of such losses may be as nearly as is practicable equalized from year to year."

If the reserve is sufficient at all times to take care of the losses caused by retirements as they take place, it will accomplish the object stated if set up on a fairly uniform basis over a period of years, and it will accomplish the object of protecting the investment in the property; it will insure the property being kept in first-class operating condition and hence insure good service, the prime object of the utility, and it will bring about that stabilization of the financial structure of the utility upon which alone future adequate service can be predicated.

To those who say that a larger amount than that is necessary, the query must necessarily be: "What is the object of this excess amount and what right have you to demand this excess amount from the patrons whom you are serving?" To those who say that they have a right to levy an amount in excess of the amount necessary as above set forth, because no matter what that amount may be they are willing to credit to any reserve a stipulated interest, my answer is that "You have not got the right to make the patrons lend you this money on any such terms except through the issuance of securities or the recognition of a debt in terms of debt."

WHERE RESERVE SHALL BE PROVIDED

The National Association of Railway and Utilities Commissioners when it adopted the Uniform System of Classification of Accounts, as I understand it, substantially committed itself to the following propositions: That a reserve should be provided where practicable sufficient for the following purposes: (1) To take care of the cost of the retirements as they shall occur; in other words, that reserve shall be of sufficient amount so that it will, as near as practicable, insure the amount necessary to meet the costs of the retirements when and as they occur. (2) That it is desirable that the operating expense account shall not be unduly distorted from year to year by charges necessary for this reserve. In the words of the text of the account: "for this purpose shall be equalized as nearly as practicable."

If all these problems could so easily be solved by some simply worded mathematical formula and justice be done, both to the utility and the public, and the public interest be served thereby, there would be no objection to this being done that I know of. But when no such thing is practically possible there can be no greater mistake on the part of either the public or the utilities than to assume or admit the possibility of that which they know not to be possible or practicable.

Each utility should, so far as is practicable and possible, establish, either through operating expenses or through appropriations from surplus, a reserve for the purposes clearly stated in Account 251: that the reserve should be adequate for the purposes for which established. It may well contain a margin of safety in this respect assuring within reason its continuous adequacy, and it is to be preferred that the reserve should be, it seems to me, somewhat more than adequate rather than less than adequate.

ONLY ONE RESERVE NECESSARY

In order to simplify the precise matter under discussion, let us eliminate that branch of the mathematical theorists who would also go further and establish a separate reserve for each class or kind of property in the plant, and by all means, let us eliminate from this discussion further niceties sometimes put forth that at the time any unit of property is retired the so-called accrued depreciation on a life basis must be calculated and the capital accounts be determined by this calculation. I do not believe that there now exists among those who have closely studied the subject very much difference of opinion on the question of whether more than one reserve is necessary. Generally it is accepted that one reserve for all classes of property is all that is necessary. We, therefore, come down to the question of whether, leaving these other points out of the discussion, there is any adequate or reasonable basis for working out any general formula based on a prophecy or assignment of future lives.

Let us not overlook this fact to begin with: That not only have we got to calculate future lives, but it is

generally accepted that in determining the amount which will be necessary to meet the retirement costs we must deduct salvage value at the time of the retirement, and also provide for the cost of dismantling.

Let us also take into consideration the following: There is no property I assume, at least in the electric field, where every unit of property when it wears out or is retired is taken through the capital accounts. As expressed in Account 251, the practice of accounting for the cost of retirements relates to important retirements, to buildings, to large sections of continuous structures, definitely identifiable units of plant or equipment.

In estimating lives those committed to a general mathematical formula base that formula not only upon ordinary wear and tear, which is to be accurately estimated for the future, and which wear and tear will not be overcome by any maintenance or repair, but the lives must be based upon an accurate calculation of the losses or retirements which will result from incapacity for service, from obsolescence, from inadequacy, from supersession resulting from new inventions and discoveries, from changes of popular demand, and from the future requirements of public authority.

SHORTCOMINGS OF LIFE TABLES

The idea is that such calculations have been possible in the past. It is my opinion that such calculations have never even approximated the lives for particular property in particular utilities. The manifest absurdity of doing some of the things which such a formula requires should upon little thought be sufficient to condemn it.

Professor Riggs, of Michigan University, in a few pages, has shown the impossibility of the whole matter in his recent book on "Depreciation of Public Utilities." He calls attention to the fact that the rail on the main line of a heavy traffic road may have a life of only two or three years while it may have a life of twenty years on another road. The life of buildings is generally determined by very many considerations having nothing whatsoever to do with the question of wear or decay. As he points out, one building may be in a city showing a 200 per cent increase of population in a decade, and may become inadequate in eight or ten years. In another city, it may last forty or fifty years before the requirements are such as to indicate its retirement.

Now, it is the experience of all of you that the abandonment of an electric power house or other operating unit of a large property will undoubtedly cause the retirement of hundreds of items which are far from ready for replacement; many, indeed, may be entirely new.

Furthermore, I think it must be your experience that in the electric industry many of the units ordinarily cared for through retirement reserve have required the use of that reserve not through wear and tear or inefficiency compared to its operating condition when new, but through the changed operating conditions that surround the locality and the industry and the art. It is beyond human ken to accurately forecast or use life tables on such a basis.

Is it not better, therefore, to face the facts as we all know them to be, rather than to build up some theoretical solution of a problem based on facts which do not exist and cannot be determined?

It does not follow that because a formula does not exist the question of an adequate or reasonable reserve cannot be determined from time to time and in such a manner as will protect all interests and assure an adequate plant and service. We must cease to think, however, in terms of generalities and confine ourselves to the individual utility and the individual situation. President McKinnon, of the United States Independent Telephone Association, in his letter of June 1, 1921, to the Interstate Commerce Commission, frankly stated the facts in terms equally applicable to the electric industry. He said:

"In dealing nationally with the question of depreciation as applied to telephone companies, we are at once met with the fact that conditions differ, not only in different states but in different parts of the same state, and between adjoining operating companies obsolescence varies according to the rapidity of growth and population. Hazards vary according to geographical location. Deterioration occurs rapidly or slowly according to climatic and soil conditions. It is at once apparent, therefore, that no answer can be given applying to the country as a whole, or by states or by companies when such companies have several exchange properties. In the ascertainment of a proper reserve for depreciation it seems therefore evident that companies must be considered individually rather than collectively or by groups."

When we come to exercise judgment in the individual case there are several factors which must be considered which give a reasonable approximation to the necessities of the situation. If the company is a large one with a considerable experience and its accounting system is in substantial accord with proper accounting practices, we have the history of retirements as casting considerable light on the situation, retirements as a whole rather than by classes of property. But we are not confined wholly to that past history. We have a present situation and the observable necessities certainly for the immediate future, and as to the individual company, a good deal of data throwing light upon future situations for perhaps a considerable period. Not only will the present condition of the property be taken into account, but the nature of the locality; any special risks or hazards; climatic conditions; wear and tear; the growth of the community, and the probable necessities which may arise within a reasonable and fairly observable time. The history of the company may show that a uniform credit to this reserve in the past indicates a reserve greater than necessary. On the other hand, circumstances immediately foreseeable may show the necessity for a larger reserve than the company has been setting aside.

I do not believe it possible to say that 5 per cent, 10 per cent, 15 per cent, 18 per cent or 20 per cent of investment should be the determining limit for a large class of companies operating under dissimilar conditions. Certainly a generalization could not be made for classes of companies throughout the country in the electric industry. And it must never be overlooked that under some circumstances and conditions a rather large percentage might be justified while in other cases a relatively small one could be shown to be adequate.

FUNCTIONS OF COMMISSIONS

I do not wish to be understood as in any way advocating the abolition of the supervisory powers of the regulatory commissions over this matter. It is my belief that in the first instance and unless unusual conditions arise the utilities should themselves be permitted to exercise judgment; secondly, that where

the matter is brought into question the commissions investigate the matter; thirdly, that that power of supervision should be exercised in connection with the individual company or situation and not by any general theoretical formula. It is my belief that the tendency of regulation is not to substitute commission judgment for managerial judgment. Laws should not be passed compelling the exercise of managerial functions by commissioners. The exercise of the function by commissions in this respect recognized in the Uniform Classification of Accounts, it seems to me, is a discretion to be exercised only in the case of abuse by the corporate officers. This is in line with the decision in the Southwestern Bell Telephone Company case, recently handed down by the United States Supreme Court.

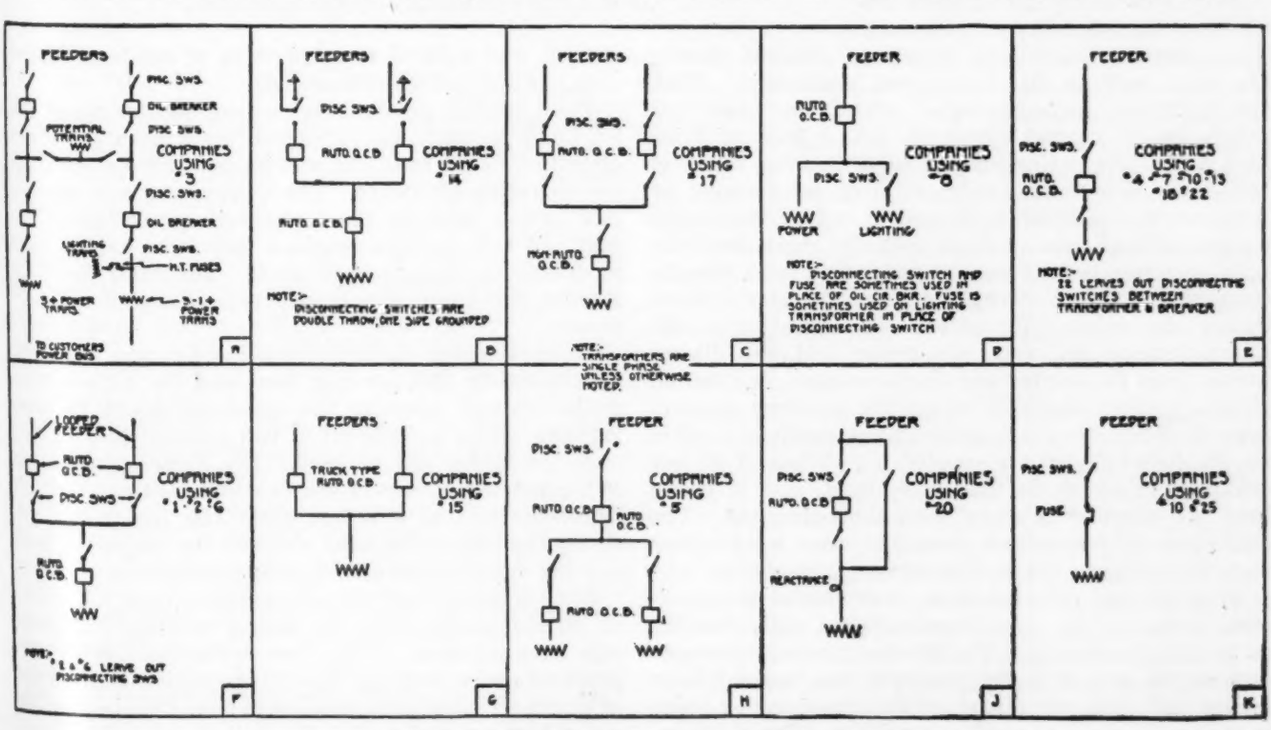
In case it becomes necessary for the commission to pass judgment in the matter of allowances or requirements for retirement reserve, if confined to the individual company or situation, the utility will have the opportunity of bringing forward all its own special circumstances relating to its own operation and plant, and the commission will have the benefit of as large a knowledge as possible of the requirements when it comes to pass upon the matter.

Automatic Substations and Duty Cycle of Oil Circuit Breakers

The Electrical Apparatus Committee Dwells on the Prevailing Practice in the Construction of Industrial Substations, Experiences with Automatic Substations, Agreement on the Duty Cycle of Oil Circuit Breakers and the Revision of Motor Rules

ACCORDING to information obtained by the Electrical Apparatus Committee of the N. E. L. A. from thirty-four companies regarding industrial substation design, oil circuit breakers are used in most of the installations, with a strong tendency during the past ten years toward a much higher kva. rupturing capacity. The committee, whose report was presented before the New York convention this week by its chairman, R. H. Tapscott, said that four or five companies report installation in their own substations of reactors in all lines serving industrial customers and others only where they are necessary to keep the possible short-circuit current within the circuit-breaker rating. Two companies reported the use of non-automatic circuit breakers only in industrial substations, while two other companies use fuses instead of oil circuit breakers. In most cases oil circuit breakers are selected to interrupt the maximum calculated short-circuit current on the basis of manufactured rating. The practice of almost all companies reporting is to depend on hand operation of circuit breakers, only two or three providing for electric operaton.

Eleven companies regularly provide two incoming lines, seven looping in and out and four adding a second radial line when the character of the service warrants the expense. Of these eleven companies eight provide



CIRCUITS OF TYPICAL INDUSTRIAL SUBSTATIONS

automatic breakers for each transformer bank, while three depend on line circuit breakers in case of trouble. Seventeen companies regularly provide only one line into customers' substations.

In the construction of transformer vaults eight companies of fifteen provide substation ventilation by means of vents, louvers or flues, while three utilize windows. Six companies install oil circuit breakers in compartments, two employ truck-type breakers and five mount equipment on pipe frame or channel iron. All companies use single-phase transformers in banks of two or three units. Two companies use three-phase units to some extent.

RELIABLE SERVICE FROM AUTOMATIC SUBSTATIONS

The service rendered by automatic alternating-current substations has been reliable, and keen interest in this development is being shown by other central stations. The automatic control of street-lighting circuits is also increasing. Five companies report the use of time clocks only for control, one company reports remote control, another a complete automatic system, while a third uses the reclosing circuit-breaker method, controlling a group of "R. O." transformers in each station.

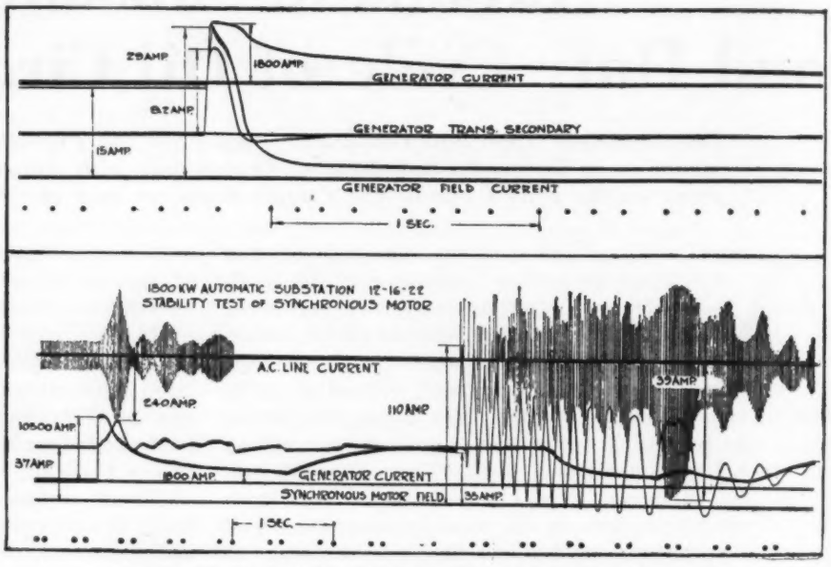
Truck-type breakers are coming more and more into use. Their advantage lies in the very simple connections between switch and bus, the elimination of disconnecting switches with their hazards and clumsiness, the small amount of labor required for installation, and ready interchangeability in case of trouble. At the present time breakers of this character are available for voltages up to 15,000, with rupturing capacity up to 20,000 amp.

Very convincing information regarding the reliability of automatic direct-current substations has been obtained during the past year in St. Louis and Cincinnati. With the 1,875-kw. motor-generator set of the Cincinnati substation in normal operation (rated load of 7,500 amp.), the alternating-current cable feeding this station was opened and reclosed after an interval of 4.56 seconds. The set continued to run on the direct-current side at reduced speed with the short-circuiting breaker across the differential series field open, thereby increasing the field strength of the generator and reducing the speed still further. By operation of the alternating-current relays the motor field was disconnected from the exciter and short-circuited, and the oil circuit breaker short-circuiting the starting reactors opened. When the alternating-current supply was again re-established the motor speeded up. When at 95 per cent normal speed the field was closed, and 15 cycles later the starting reactors were short-circuited. The conditions attending this operation were more severe than the ordinary alternating-current disturbance.

An additional test was made to determine the maximum torque of the synchronous motor while running as an induction motor. The alternating-current supply was opened, and with the generator tied to the Edison system full field was placed on the generator in order to reduce its speed as much as possible. With the generator motoring at 82½ per cent normal speed, the alternating-current supply was closed again. Within one second the generator was delivering 8,000 amp. at 268 volts. The total duration of induction-motor operation was ten seconds.

The generator normally operates as a shunt machine and the load is regulated by a contact-making voltmeter. When a gradual overload occurs the output of the machine is limited by the contact-making ammeter. In the case of sudden overload the contact-making voltmeter and ammeter both function to reduce the current on the machine, but a more rapid action is obtained by the opening of the short-circuit breaker across the differential series field, which limits the output of the machine to 9,000 amp. at zero voltage.

In a test in which a dead short circuit was thrown across the bus the generator current reached the maximum value of 59,700 amp. in four cycles. This overload current was reduced to rated value of machine (7,500 amp.) in one and a tenth seconds.



ACTION OF AUTOMATIC SYNCHRONOUS MOTOR-GENERATOR SET AT ST. LOUIS UNDER SHORT-CIRCUIT CONDITIONS

The 1,800-kw. synchronous motor-generator set of the St. Louis company was subjected to a momentary short circuit of 46,000 amp. and was in condition for continuous operation afterward. The short-circuit current was held to this value by the compensating pole-face winding. At this extreme overload there was only a very moderate momentary spit at the generator brushes. During the short circuit the voltage fell practically to zero.

To show motor stability the generator was loaded to approximately 125 per cent load and the high-tension feeder opened, allowing the generator speed to drop rapidly. After an interval of two and one-quarter seconds the feeder was reclosed. The highest fluctuation in the motor-field current was nearly three times normal. Three-quarters of a second after the feeder was reclosed the motor-slip relay reduced the generator load and the motor pulled quickly into synchronism.

Some companies are installing temperature indicators on all generators, some on new generators and some only on generators which show a relatively high temperature under ordinary operating conditions. A total of thirty-six have been installed to date, twenty-four for steam turbines and twelve for waterwheel units.

In practically all of the newer stations and those now under construction electric drive has been adopted for a very large proportion of the auxiliaries. Preference between a supply of energy from the main bus only and supply from a combination of house turbo-generator and house service transformers has shown a definite trend toward the latter, because of the advantage of independent sources of supply and adaptability to heat balance adjustment. The only outstanding new feature in this connection is the adoption of a direct-current shaft-driven auxiliary unit for supplying excitation and condenser auxiliaries or an alternating-current unit for supplying auxiliaries only.

Constant-speed alternating-current motors in generating stations are now being started by one of the following methods: (1) Individual starting compensators or auto-transformers; (2) starting bus; (3) through individual reactors; (4) directly across the line. In the Calumet station, Chicago, several motors up to 150 hp. are regularly started by connecting them directly across the line. The question has lately arisen whether the synchronous motor should not be used more largely by central stations to improve power factor.

Past experience with generator fires has shown the necessity of providing some permanently installed means of coping with this trouble, supplementing preventive means such as balanced differential relays, periodic insulation tests, etc. Only three of the companies which have installed such equipment have had experience in actual fire fighting, these fires all being extinguished by the use of steam. Test data on experiments with inert gas have been made by the Hartford and St. Louis companies, but neither company has had any experience with a fire.

Automatic control for waterwheel-driven generators is rapidly spreading throughout the country. This type of control has usually been installed with generators having a capacity between 200 kva. and 750 kva. However, a 5,000-kva. installation at Searsburg, Vt., has been so equipped recently, and an automatic station of the Peninsula Power Company in Wisconsin will have two 2,000-kva. units.

DUTY CYCLE OF CIRCUIT BREAKERS SETTLED

A definition of circuit-breaker duty cycle has been agreed upon by the A. I. E. E. protective devices committee and the electrical apparatus committee of the N. E. L. A. as follows:

1. Interrupting rating is based upon the highest r.m.s. current at normal voltage at which oil circuit breaker can interrupt under the operating duty specified.
2. Operating duty shall consist of a definite number of unit-operating cycles at stated intervals.
3. Each unit operating cycle shall consist of closing the circuit breaker, followed immediately by the opening of the breaker.
4. The breaker shall perform its rated operating duty without emitting flame. The condition of the circuit breaker at the end of any operating duty within its rating shall be: (a) Inspection shall show the breaker to be substantially in the same mechanical condition as at the beginning. (b) Inspection shall show the main current-carrying parts of the circuit breaker to be in substantially the same condition as at the beginning. However, the interrupting ability of the circuit breaker may be materially reduced.

The foregoing operating duty is made on a two-shot basis. On any other basis the following factors shall be applied: (a) One interruption heavy-overload duty, 125 per cent; (b) two-interruption duty, with two-minute intervals between interruptions, 100 per cent; (c) four-interruption duty, with two-minute intervals between interruptions, 70 per cent; (d) four-interruption duty, with half-minute intervals between interruptions, 60 per cent; (e) four-interruption duty with no time delay between full open position and start of closing position, 30 per cent.

Several companies have installed equipment to provide communication over their high-tension transmission lines. In most cases it has been for simplex operation, although a duplex system is installed on the Duquesne Lighting Company's system. The operation of carrier-current apparatus is very satisfactory, and communication can be maintained through disturbances which would cripple the line telephone.

Several types of experimental relays have been developed to operate on carrier current, making possible the remote control of switches by means of impulses sent over the power lines.

At least two systems of complete remote supervision and control of distance switching over telephone lines have been developed and are being installed.

A joint committee of all interested organizations has agreed that the recommended standard voltage shall be that which will supply the proper average voltage to 115-volt lamps. One hundred and ten volts and 120 volts have been listed as recognized values, although the latter is discouraged for new systems.

As a whole, the use of single-phase transformers seems to be favored over three-phase, although there are several ardent supporters among the large companies for the latter, with sound arguments to back up their contention.

Regarding the effect of colors of transformer cases on temperatures, L. J. Moore and J. S. Moulton, San Joaquin Light & Power Corporation, advised the committee that gray paint will not reduce oil temperature more than 3 deg. to 4 deg. F. or 1 deg. to 2 deg. C. during extremely hot weather. They maintain that any expenditure to repaint black cases now in service would not be justified in any way.

Many companies report complete satisfaction with centrifugal oil separators; several say this method is slower than the blotter press, while others report using the centrifugal machine as a primary purifier and finishing up with one run through the blotter press.

Various opinions have been expressed regarding the features which should be incorporated in temperature indicators for distribution transformers. Among them are: (a) The device must be low in first cost and maintenance expense; (b) it must be compact, easily installed and readily visible from the ground; (c) it must be easily and quickly reset; (d) it must be positive and reliable; (e) it must be weatherproof.

Rules governing the installation and use of motors on central-station distribution circuits have been revised. Among the features were the incorporation of tables giving the allowable starting current for different-size motors with free and blocked rotor, also the full-load running current.

The recent rapid growth of transmission systems has produced a definite and increasing tendency toward the use of various types of voltage-regulating equipment, including tap-changing devices or ratio adjusters on transformers, induction regulators, step-type regulators, synchronous condensers and synchronous boosters. Of these the tap-changing device is coming into rapid favor. Several cases have been reported where large induction regulators are used for controlling the voltage at the end of the line or on the distribution buses.

For the purpose of promptly isolating an individual line feeding into an alternating-current network an automatic network protector has been developed.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Power Plant Records.—F. S. RUTLEDGE.—A systematic method of tabulating important data is essential to the efficient operation of a power plant. Several examples of what this means and how it may be readily accomplished are given.—*National Engineer*, May, 1923.

The Cross-Flow Impulse Turbine.—F. NAGLER.—Particulars regarding a type of waterwheel designed for use with high heads and called the cross-flow turbine are discussed. In this turbine jets make an angle greater than 45 deg. with tangent, the buckets are flattened with curvature less than 90 deg. and the bucket inlet is inclined forward. Aside from the advantages in speed, the author claims that the wheel automatically corrects one of the defects that contributed greatly to the failure of single-flow impulse turbine. This failure is the backing of water into the wheel, resulting in its being dragged around with the wheel and ultimately discharged at wheel velocity.—*Mechanical Engineering*, May, 1923.

Generation, Control, Switching and Protection

Lightning Arresters.—H. YAGI.—A formula is derived which gives the magnitude of the series resistance of the horn arrester required for a given number of air gaps. The shunt resistance that would make the arc unstable is then determined. The discharge characteristics of an aluminum-cell arrested are also considered, and it is shown that the volt-ampere characteristic, which simply gives the relation between effective values, is entirely inadequate to cope with the discharge phenomena, which generally contain complicated and abrupt changes of instantaneous values. The possibilities of utilizing the static capacity of the cell arrester as a high-frequency absorber are pointed out. The author proposes for this purpose the use of a shorter air gap with series resistance and also a static condenser in parallel with the simple air gap hitherto employed.—*Journal of the Institute of Electrical Engineers of Japan*, April, 1923.

Oil Circuit Breakers of High Interrupting Capacity.—C. PALESTRINO.—This paper, presented before the recent meeting of electrical engineers in Turin, deals with the latest achievements, studies and developments available and suggests how the type and the interrupting capacity of a breaker must be chosen in order to meet the conditions of a given installation. In the first part of this paper the distance at which the rupture of the arc must take place, the number of contacts, the duration of the arc, the oil level in the tank, the pressure of the oil, the velocity of the arc rupture, the formation of gas bubbles, and so on, are fully treated in detail with formulas and diagrams. In the second part the calculation of the maximum interrupting capacity and a close study on the phenomena following short circuits can be found. A general survey of the American, German and French rules for constructing oil switches concludes a very interesting paper.—*Elettrotecnica*, March 25, 1923.

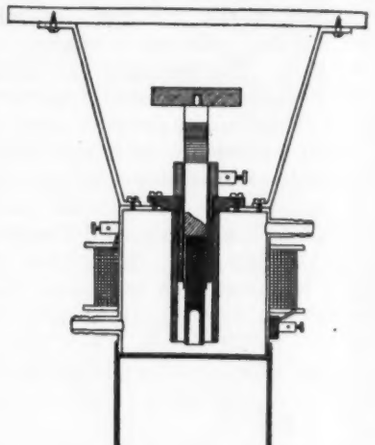
Transmission, Substations and Distribution

Heating of Cables Carrying Current.—E. SACCHETTO.—The determination of the current intensities permissible in cables for transmission of electrical energy is still far from being on a practical working basis. The author makes some useful observations regarding the determination of the thermic resistivity of insulators and investigates the princinples on which the tables, which give the maximum current capacity of buried cables of impregnated paper, were made.—*Elettrotecnica*, March 25, 1923.

Cable Geometry and Calculation of Current-Carrying Capacity. — D. M. SIMONS.—The main part of this paper deals with the errors in the standard formulas for calculating the thermal resistance and geometric properties between the conductors and the sheath. A graphical method of correcting the errors is obtained in terms of what is called the "geometric factor." The results are tabulated for two, three and four-conductor cables throughout the range of practical sizes. The check between the results of the graphical correction method and the published experimental data on this subject is very satisfactory and emphasizes the errors in the standard formulas. The thermal resistance between the sheath and the duct is mentioned briefly, and an appropriate method of finding the resistance between the duct and the region at base temperature is outlined. The previous work is then combined into a simple formula giving the allowable current for n-conductor cables, there being any number of similar cables in the duct bank. The formula is also enlarged to cover the case of cables in the metric and square-inch systems, and cables are buried directly in the ground. The method of including the effect of induced sheath currents in single-conductor cables and of dielectric losses is shown. Finally, the procedure to use in case the cables in the duct bank are not all of the same type is outlined. This paper is to be presented before the A. I. E. E. Convention at Swampscott in June.—*Journal of the A. I. E. E.*, May, 1923.

Units, Measurements and Instruments

Simple Poulsen Lamp.—L. BERGMANN.—A very inexpensive and easily made Poulsen arc lamp is described, which gives, the author claims, undamped oscillations of remarkable regularity. This apparatus may be used for measuring or demonstration purposes where the relatively high cost and the limited life of a vacuum-type lamp are prohibitive factors. The arc is inclosed in a tight vessel through which illuminating gas is circulated and burns between a heavy carbon electrode



UNDAMPED OSCILLATIONS OF REMARKABLE REGULARITY CLAIMED FOR THIS POULSEN LAMP

and a copper plate. The latter forms the bottom of a copper pot, which is filled with water. Around the gas vessel is placed the winding of the magnetic field. To avoid a steady burning of the arc at one point, the carbon electrode is hollow. Around the carbon is placed concentrically an iron tube, which concentrates the magnetic flux. With 80 volts across the arc and 4 amp. direct current, a wave length of 3,000 m. at 5.5 amp. high-frequency current may be obtained with a suitable oscillatory circuit.—*Jahrbuch des Drahtlosen Telegraphie und Telephonie*, March, 1923.

Illumination

Paint Characteristics and Conditions to Be Considered in Effecting Better Illumination. — C. H. BRYCE. — The author describes the two classes of paint—oil paints and water paints. In the first class are mentioned lead in oil, gloss interior, flat oil paint, gloss and flat enamels; in the second class, the kalsomines. Proper preparation of the painted surface for light reflection is discussed. The use of paint under artificial light and daylight is considered as well as other factors relative to the artistic and decorative use. Some interesting data on the variation of reflection factors of various paints under

different conditions are given in tabular form.—*Transactions of the I. E. S.*, April 1923.

Refilling of Electric Lamps. — O. RIGILLO.—A new and successful system of refilling worn-out electric lamps is explained and illustrated. At the end of the lamp a very small hole is made (about 6 mm. in diameter), and through it the lamp is cleaned, the old filament is taken out and the new one is introduced. The latter is elastic so that it can pass through the hole, but as soon as it is inside the lamp it opens. This refilling process can be made at a very reasonable cost and it requires but a few tools.—*Ingegneria*, Feb. 1, 1923.

Motors and Control

Motors for Mines with Explosive Gases. — H. RICHTER. — The fine wire mesh which is used extensively in all open-flame miners' lamps to confine any explosion to the interior of the lamp has been found unsuitable for electric motors in which sparks are liable to occur. Much more satisfactory results were obtained with the plate protector, which is built up of a number of thin steel plates. In case of an internal explosion the gas pressure raises these plates about $\frac{1}{16}$ in., and the resulting narrow slits permit the escape of the burned gases and yet cool them off sufficiently to prevent the ignition of outer gases. However, if one of these plates should become bent the entire protection would be lost and the motor would become dangerous. The latest types are therefore built totally inclosed and are so heavily designed as to withstand safely an internal pressure of 8 atmospheres. Every motor is tested by being filled with a mixture of 18 per cent illuminating gas and 82 per cent air, which is exploded by a spark. During this test the motor stands in a wooden box, also filled with the gas mixture. The motor is pronounced safe if its internal explosion does not ignite the outer gas atmosphere.—*Siemens Zeitschrift*, April, 1923.

Starting Direct-Current Motors with Current-Limit Type Controllers.—C. A. ARMSTRONG.—The principle of three types of series-lock contactors is explained and the operation of a motor-controller using these types of contactors is discussed. Diagrams and characteristic curves of various types of series lock-out contactors are given. —*Power*, April 24, 1923.

Heat Applications and Material Handling

Lining Acid Electric Furnaces.—J. M. QUINN.—Careful selection of materials for lining the acid electric furnace is essential. It should be kept in mind that the materials containing the least amount of impurities have the highest melting point and therefore are more refractory than those containing elements which dilute the purity. The author describes the various materials which can be used and methods for handling them. What the author asserts to be the best method for lining an electric furnace is to use high-grade silica brick for the bottom and side walls up to the roof.—*Iron Age*, April 19, 1923.

Electrophysics, Electrochemistry and Batteries

Influence of Cold Rolling on the Properties of Sheet Steel.—Y. NIWA and J. MATURA.—The change of the inner structure of steel by successive cold rolling as disclosed by the interference X-ray method is discussed. It is shown that the results obtained in the experiment may be interpreted by assuming that the crystal grains are divided by rolling stress into finer groups of cubic lattices which slide and rotate between adjacent planes and finally rearrange themselves in such a manner as to bring the edge of the lattice in parallel to the direction of rolling.—*Research Bulletin No. 122 of the Electrochemical Laboratory, Tokyo, Japan.*

Current Distribution and Throwing Power in Electrodeposition. — H. P. HARING and W. BLUM. — "Throwing power" in electrodeposition is defined as the deviation of the actual metal distribution from the primary current distribution. It is shown matematically and experimentally to be dependent upon the rate of change of cathode potential with current density, the resistivity of the solution and the cathode efficiency at different densities. A simple apparatus for the measurement of throwing power has been developed and applied to the study of copper sulphate and cyanide solutions. —*Paper presented before American Electrochemical Society, New York*, May 3-5, 1923.

Traction

New 4,000-hp. Electric Locomotives for Norfolk & Western Railway.—T. C. WURTZ. — The conspicuously new features of the electric locomotives described in this article include cab structure carried by side frames of vanadium steel, four pairs of drivers in single truck per cab, a single 1,000-hp. motor per jack shaft, oil-insulated, force-cooled transformer and unique arrangement to reduce torque on any motor to prevent slipping. — *Railway Review*, April 14, 1923.

Reducing Railway Maintenance Costs with an Electric Furnace—The performance and results obtained through the use of an electric steel furnace of the Lehigh Valley Transit Company at Allentown, Pa., have proved that it is a very essential piece of apparatus for any electric railway. Through its use correct castings at a low cost are not only produced, but in a very short time and with very little inconvenience, so that it is unnecessary to withhold the equipment from service to any considerable extent while making repairs. The use of the steel furnace also enables the heads of various departments to make up special devices which result in labor saving and additional economies.—*Electric Railway Journal*, April 21, 1923.

Application and Economics of Automatic Railway Substations.—L. D. BALE. —An abstract of this paper may be found in the ELECTRICAL WORLD report of the A. I. E. E. midwinter convention, Feb. 24, 1923, on page 443.—*Journal of the A. I. E. E.*, May, 1923.

Telegraphy, Telephony, Radio and Signals

Distortion-Free Telephone Receivers. —J. F. J. BETHENOD.—The possibilities of a distortion-free telephone receiver are discussed. By means of triode devices it is theoretically possible to make such an apparatus having uniform sensitiveness over any range of frequency required. The same device may be applied to oscillographic or radiotelegraphic apparatus.—*Proceedings Institute of Radio Engineers*, April, 1923.

Signaling on the Frankford Elevated. —J. N. DODD. — The special problems met and solved on this recently completed elevated line are discussed. The first article deals particularly with the signals, trips, electric circuits and air lines, while the second considers the interlocking plans and speed-control signals. The signals cause the motorman to run no faster than a predetermined speed and to encourage him to run close to it and in this way to obtain full capacity for the run. — *Electric Railway Journal*, April 28 and May 5, 1923.

Tests of Radio Receiving Sets. — During the past two years the Bureau of Standards has been developing methods for testing radio receiving sets and has tested a number of different types of equipment. This circular describes tests of regenerative sets using electron-tube detectors of the type intended for the reception of continuous-wave signals from arc transmitting stations on wave frequencies down to 60 kilocycles or wave lengths up to 5,000 m. A limited number of these circulars are available.—*Letter Circular No. 90 of the Bureau of Standards.*

Miscellaneous

Developments During 1922.—This issue of the periodical is devoted to a series of illustrations of machinery and apparatus constructed or put into operation during the last year. These are classified under "electric traction," "prime movers," "generation and distribution," "electricity in industry" and "aircraft."—*English Electric Journal*, April, 1923.

Suggestions for Saving Heat in Manufacturing Plants. — C. L. HUBBARD. — The author outlines several methods for reclaiming much of the heat that is now ordinarily wasted in manufacturing plants, and the suggestions presented should furnish much food for thought to the engineer operating plants of this character. Some of the places where heat may be gained and the methods of accomplishing this are saving of frictional heat, reclaiming heat from ventilating air, reclaiming heat from moisture-laden air, etc.—*Power*, May 8, 1923.

New Books

Reviews of the Latest Contributions to
Technical, Industrial and Commercial Literature of Particular Interest
to Members of the Electrical Industry

The "Electrician" Handbook

Forty-first edition. London: Benn Brothers, Ltd. 1,364 pages.

This year's edition (the forty-first) of "The 'Electrician' Electrical Trades Directory and Handbook of the Electrical Engineering and Allied Trades"—the well-known "Blue Book"—contains the usual complete information on the electrical trades in Great Britain and all her colonies and possessions and has extenive information concerning the other countries of the world. Numerous British tariff changes have caused considerable revision of import duties. Among new subjects included in the volume are wireless broadcasting regulations and the conditions with which broadcast receivers must comply, an abstract of the electricity supply act of 1922 and particulars of the progress made with the reorganization of electricty supply—all these pertaining to Great Britain.

The various sections of the book contain an alphabetical and classified directory of electrical undertakings of all kinds and also a handbook of detailed and general information, such as a legal digest, wiring rules, tables, etc,

Metals and Their Alloys

By Charles Vickers. New York: Henry Carey Baird & Company, Inc. 767 pages, 110 illustrations.

It appears that foundry practice in irons, brasses, bronzes and aluminum alloys is passing through a transition period. Books current and those being published in considerable numbers even now merely reflect conditions in thousands of small foundries scattered throughout the world. Shaping metal pieces by pouring melted alloys into molds is an art which has been known since antiquity. Following the general rule that the older the art the less is known about its fundamental principles, such foundries operate largely by rule of thumb and tradition. Therefore it is not surprising to find that most of the books merely reflect these superstitions and practices.

Some engineering investigators have the hope that eventually the scientific principles underlying foundry management and production will be well known and that foundries in general will operate in strict accordance with those laws. That period undoubtedly is far in the future. However, scientific research has disclosed a number of attractive new alloys, which are being demanded in increasing amounts by consumers. Their production and even their heat treatment often involve entirely new processes at present unknown to the old-time foundryman. Therefore by press of circumstances he is being driven to a consideration of better production methods.

This book by Charles Vickers is typical of the transition stage. It has gone a long way forward from the foundry book published as recently as twenty years ago, without dipping under the surface of the tremendous ocean of material made available by more modern metallurgical research. Even though the author talks very little about scientific principles, the book apparently is free from the ridiculous beliefs and assertions which are spread as gospel truth in tons of "literature." As a compendium of useful information —"practical," if one will—this book is probably without an equal. It will find its way into the hands of every progressive foundryman or engineer interested in the production of non-ferrous alloys. E. E. THUM.

Essais des Machines Electriques

By C. F. Guilbert. Paris: J. B. Baillière. 552 pages, illustrated.

This new book of nearly 600 pages, well illustrated with diagrams and figures, covers nearly the whole field of commercial testing of electrical machinery. There are sections dealing with direct-current generators and motors, alternators and synchronous motors, transformers, induction and alternating-current commutating motors and synchronous converters. For each of these types the author discusses characteristics of machines under load and predetermination of characteristics, followed by methods of direct and indirect testing and efficiencies.

The author, who has taught courses in electrical design and construction in French technical schools for many years, states that he wishes to shorten the time a machine must stay on test without sacrificing any accuracy, and in fact even increasing the effectiveness of the present commercial test, by making use of a "method of corrections" which he has used for some time. This is a method of correcting for variable speed (voltage, current, load or excitation) when this is supposed to have been kept constant.

The last hundred pages include appendices containing the French "Rules for Standardization and Specification of Electrical Material" (French Electrotechnical Committee), French rules for normal conditions of operation and test of turbo-generators, rules for standardization and specification of transformers and supplementary rules for standardization and specification of tests of electrical machinery—the last three of these being adopted by the Union of Electrical Manufacturers during June-July, 1920. At the end of the book is a very complete comparison of French, British, American, Swiss and German standardization rules.

M. Guilbert emphasizes the importance of graphic construction permitting the predetermination of characteristics of machines from experimental data that are comparatively easy to obtain at a relatively small expenditure of energy.

With its many references to original articles, its large appendices, its clear diagrams of connections and characteristic curves of machines, and, above all, its discussion of various tests and comparison of formulas, this book is a valuable addition to the engineer's library of books on commercial and laboratory testing. F. G. TAPPAN.

Die Elektrometallöfen

By E. Fr. Russ. Munich and Berlin: R. Oldenbourg. 161 pages, 123 illustrations.

A review of the various types of non-ferrous furnaces used in America. Nearly all of the information is apparently abstracted from the bulletins issued by the Bureau of Mines and from various articles published in *Chemical and Metallurgical Engineering*. It seems at first as if the furnace which has prominence all through the book were an original design, but upon closer examination it is found to be practically a replica of the American Booth rotating furnace, built, however, for three-phase operation. For German conditions the author has no doubt done a great service toward popularizing electric alloy furnaces.

ARTHUR PALME.

Der Funkentelegraphische Wetter und Zeitzeichen Dienst

By H. Thurn. Berlin: M. Krayn. 82 pages, 15 illustrations.

This booklet is a collection of articles by Mr. Thurn which have been published in German periodicals on the subject of radio broadcasting weather reports and time signals. A large part of the book is devoted to verbatim mention of rulings established at different international meetings. The Telefunken and the Huth sending, receiving and self-registering apparatus are described in detail, including the very latest time-registering set of Huth, which is based upon the Johnsen-Rahbeck effect. ARTHUR PALME.

Books Received

Elektrische Durchbruchfeldstarke von Gasen. By W. O. Schumann. Berlin: Julius Springer. 246 pages, illustrated.

Stimulating the Organization. By Orline D. Foster. New York: Harper & Brothers. 413 pages.

The "Electrician" Annual Tables of Electricity Undertakings—1923. Thirty-sixth Edition. London: Benn Brothers, Ltd. 140 pages.

Elements of Radio Communication. By Ellery W. Stone. New York: D. Van Nostrand Company. 318 pages, illustrated.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Insull Buys in Indiana

Chicago Interests Take Control of the Northern Indiana Gas & Electric Company

THE Northern Indiana Gas & Electric Company of Hammond, Ind., has been purchased by Samuel Insull and his associates of the Commonwealth Edison Company, the Middle West Utilities Company and the Public Service Company of Northern Illinois. Announcement of this purchase was made on June 4, when an official statement declared that arrangements have been made by Randal Morgan, representing the United Gas Improvement Company of Philadelphia, and Samuel Insull to pass over this Indiana utility to the Chicago interests represented by Mr. Insull. The United Gas Improvement Company will, however, remain interested in the property.

The Northern Indiana Gas & Electric Company supplies electricity in Hammond, East Chicago, Indiana Harbor, Whiting, Michigan City and other places in the north end of the state. It serves a community with a total population put at 421,365. Last year the total gas and electric business was about $10,000,000.

The official announcement declared: "The exact corporate plans have not yet been decided upon, but the business will be operated as a separate organization and not as a subsidiary of any existing companies. The plan involves operating under one organization gas and electric properties in northern Indiana which have been heretofore prorated separately and the greater portion of which were in the Northern Indiana Gas & Electric Company. The basic principle involved is the centralized production of both electricity and gas. It is probable that a large central station for the generation of electric power will be built in northern Indiana and electrical energy produced will be distributed not only in that territory, but also on the Illinois side of the line."

Los Angeles Bond Issue Fails to Carry

A dispatch to the ELECTRICAL WORLD from Los Angeles says that the issue of $35,000,000 in bonds to cover projected activities of the Public Service Commission of the city of Los Angeles, which was submitted to the voters on Wednesday of this week, failed to receive the necessary two-thirds vote, though a small majority was recorded in its favor. Exact figures are not yet available, but they cannot change the result to a sufficient extent to authorize the bond issue.

Ten million dollars of this issue, had it been authorized, would have been spent in rehabilitating the city distribution system and in improvements to the municipal hydro-electric plant. The remaining $25,000,000 was to be used for power development at Boulder Canyon on the Colorado River after the completion of the government dam at that point.

First Mercury Boiler Is Now Installed

The mercury boiler to be used by the Hartford Electric Light Company at its Dutch Point plant is in place and preliminary operation will, it is announced, start within a few weeks. This installation has attracted much interest because of its novel character. The boiler is installed outside the original station. Oil is to be used as a fuel. There will be approximately 15 tons of mercury used in the installation, and every precaution against leakage in the form of vapor will be taken.

It would not be possible to develop and operate this plant were it not for the electric and acetylene welding processes. Mercury amalgamates with copper, and as the temperatures used are so much higher than steam temperatures, there is no form of fiber gasket which will stand the temperature. The pressure used as compared with steam is extremely low. The maximum on this boiler will not be in excess of 35 lb. by gage.

The mercury boiler itself is built up of a large number of tubes with the edges welded together at the bottom. These tubes are hexagonal for about two-thirds of their length and circular at the top. The tops of the tubes are expanded into a plate and welded. All pipe connections from the boiler to the turbine are also welded. The mercury vapor passes normally through the nozzles to the wheel and is governed in approximately the same manner as any other revolving apparatus. In case of change of load on the turbine, the governor does not close the valve as in ordinary cases, but diverts the proper amount of vapor from the nozzles direct from the boiler to the condenser. This operation requires a damper rather than a tight-fitting valve. On account of the high temperatures it would not be practicable to use a valve, as at the high temperature of the vapor the steel is liable to warp.

Signs Electrification Bill

Governor Smith of New York Disregards Railroad Pleas—Gas Service Charge Prohibited

ON SATURDAY last Governor Alfred E. Smith signed the Straus-Kaufmann bill providing for the electrification of all railroads operating within the limits of New York City. This measure was fought by the steam railroads on the ground of expense and difficulty, their representatives contending that an outlay aggregating more than a hundred million dollars will be entailed upon the roads. The New York Central, which now operates freight trains by steam over tracks running from Spuyten Duyvil to the lower end of Manhattan Island by way of Eleventh Avenue, will be hardest hit. The Long Island Railroad, however, will have to spend in electrifying its freight tracks, terminals and sidings more than $30,000,000, according to the general solicitor of the company; the Baltimore & Ohio will have to electrify its Staten Island terminal and lines, another tremendous piece of construction, while the many terminals along the Brooklyn water front will have to be electrified too. It is announced that the railroads will contest the law.

The Pennsylvania and the New Haven alone among the lines entering the city limits have completely electrified their lines to date.

GAS SERVICE CHARGE FORBIDDEN

Another public utility bill signed by Governor Smith provides that the maximum gas rate in New York City shall not be more than $1 per 1,000 cu.ft. The courts last year declared the 80-cent rate prescribed by former legislation confiscatory. The gas companies will contest the new law, which sets up a 650 B.t.u. standard alleged to be unsafe, in the courts. Still another bill approved forbids gas companies to impose a service charge. While this bill is statewide in its application, it was drafted principally for the relief of gas consumers in Westchester County. From comments made by the Governor at the hearing on this bill it had been expected it would be vetoed.

Governor Smith has also affixed his signature to the Ryan bill, which authorizes the transmission and sale at cost by the state to municipalities conveniently situated of electrical energy generated above the needs of the canal system. This will apply to the surplus energy generated at the

state-owned plant at Crescent Dam and Vischer's Ferry on the canalized portion of the Mohawk River and will make possible its sale directly to the cities in the capital district.

The much-discussed Ryan bill amending the Public Service Commission law has become Chapter 891 of the Laws of 1923. This measure is not retroactive in effect, but does take away from the commission the right in the future to fix a temporary rate or charge and strikes out the provision that the commission may establish a new rate or charge "notwithstanding that a higher rate or charge has been heretofore authorized by general or special statute." Its intent is to put the law back to where it was prior to the amendments of 1921 in relation to the power of the Public Service Commission to raise rates.

Southern California Edison Gets Prize

The First Award of Gold Medal of the Charles A. Coffin Foundation, Established by the General Electric Company, Goes to Pacific Coast—Selected from Eighteen Contenders

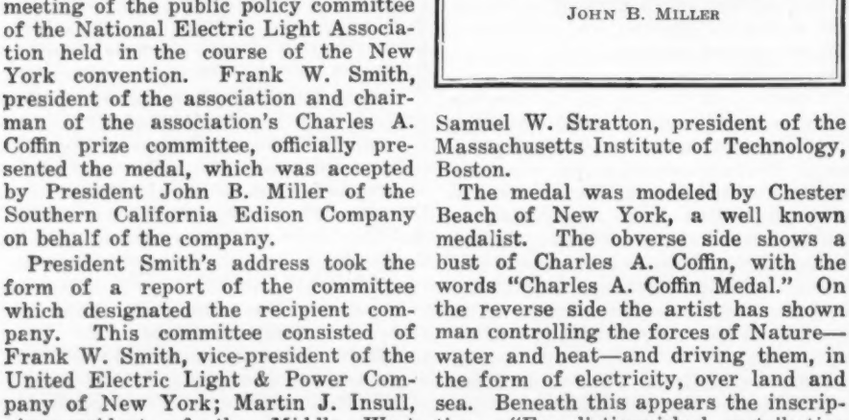
THE Southern California Edison Company, Los Angeles, was presented on June 7 with the gold medal of the Charles A. Coffin Foundation, offered for the first time last year to the electric public utility company of the United States which made the most notable contribution during the year to the development of electric light and power service. This is the first award of the medal to be made by the foundation, which was created by the General Electric Company. The recipient was selected from eighteen electric light and power companies which submitted their year's records for consideration, and the decision is understood to have been extremely close.

JOHN B. MILLER

The award was made during the meeting of the public policy committee of the National Electric Light Association held in the course of the New York convention. Frank W. Smith, president of the association and chairman of the association's Charles A. Coffin prize committee, officially presented the medal, which was accepted by President John B. Miller of the Southern California Edison Company on behalf of the company.

President Smith's address took the form of a report of the committee which designated the recipient company. This committee consisted of Frank W. Smith, vice-president of the United Electric Light & Power Company of New York; Martin J. Insull, vice-president of the Middle West Utilities Company of Chicago, and Dr. Samuel W. Stratton, president of the Massachusetts Institute of Technology, Boston.

The medal was modeled by Chester Beach of New York, a well known medalist. The obverse side shows a bust of Charles A. Coffin, with the words "Charles A. Coffin Medal." On the reverse side the artist has shown man controlling the forces of Nature—water and heat—and driving them, in the form of electricity, over land and sea. Beneath this appears the inscription: "For distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry." In a panel appears the name of the company receiving the award.


CHARLES A. COFFIN MEDAL
FOR DISTINGUISHED CONTRIBUTION TO THE DEVELOPMENT OF ELECTRIC LIGHT AND POWER FOR THE CONVENIENCE OF THE PUBLIC AND THE BENEFIT OF THE INDUSTRY

GOLD MEDAL OF COFFIN FOUNDATION, WON BY LOS ANGELES CENTRAL-STATION COMPANY

The award of the medal was accompanied by the presentation of a check for $1,000 to be applied to the employees' benefit fund of the Southern California Edison Company, under the terms of the foundation.

The Charles A. Coffin Foundation was established by the board of directors of the General Electric Company in December, 1922. It constitutes a tribute to Charles A. Coffin, who retired that year after forty years of association with the electrical industry, this period including the founding by him of the General Electric Company, of which he was leader for thirty years.

The foundation comprises a fund of $400,000, the income from which, amounting to approximately $20,000 per year, is to be devoted to rewarding outstanding service in the electrical field. In addition to the gold medal to be awarded annually to an electric light and power company, provision is also made for a gold medal to be awarded to an electric railway company. Fellowships to graduates of American colleges and technical schools amount to $5,000 annually and prizes amounting to $11,000 annually are provided for employees of the General Electric Company who have made signal contributions toward the increase of the company's efficiency or its progress in the electrical art.

Colorado Springs to Vote on Franchise Next Week

The issue of a new franchise to the Colorado Springs Heat, Light & Power Company will, as already announced in the ELECTRICAL WORLD, be put to a vote of the people on June 12. The election is the culmination of a bitter fight during the past few months between the City Council, the public and the power company. Six weeks ago a committee representing the bondholders of the company went to Colorado Springs and adjusted every claim that the City Council had against it, which included a cash payment of $115,000 to cover the cost of a pipe line which the city claimed should under the terms of the franchise have been built by the company. Subsequently the Council adopted a resolution bitterly condemning the utility and asking the people to defeat a renewal of the franchise, which will expire Sept. 8.

When the company brought Gen. George Goethals to Colorado Springs to investigate the power possibilities of the water system a few weeks ago he requested certain information from the city which was refused on the ground that it was confidential and that General Goethals had been brought to Colorado Springs for political purposes. This attitude of the city authorities aroused much criticism, but the situation, with its possibilities of municipal ownership, is too confused to permit any prediction of its final outcome.

California Board Set Up

Federal Power Commission Provides for a Subsidiary Body to Study Three River Problems

AUTHORITY to set up an interdepartmental board for the study of certain streams in California, bestowed by the Federal Power Commission a month ago, has been acted upon by the three government departments concerned—War, Interior and Agriculture—which have each appointed a representative to the new board, and the Governor of California is expected soon to designate a fourth member. The commission, according to an official announcement from Executive Secretary Merrill, is referring to the board for its examination, report and recommendations the three following matters:

1. The best scheme of development of the American River and its tributaries above Folsom.

2. The proposed diversion of the waters of the Trinity River into Sacramento Valley for power and irrigation purposes.

3. The best scheme of development of the North Fork of the Stanislaus River.

POINTS INVOLVED

It is desired that these matters be taken up in the order named and that each be made the subject of a separate report and recommendations. The following are the principal matters to be considered by the board, as explained by Mr. Merrill:

1. American River. Applications are on file for power developments on this stream which are apparently not suited to a complete and coherent development of the stream in the combined interest of power, irrigation, hydraulic mining and flood control. In carrying out its study the board should investigate and determine whether in its opinion the Rubicon River should be developed by diversion into the South Fork of the American River, by diversion into the North Fork of that river, by development along its own natural course, or by any combination of these; whether the Middle Fork of the American River should be developed by diversion into the North Fork, or along its natural course, or by a combination of these two. In general it is desired that the board draw up, to the extent that the data available warrant, a general plan for the complete development of the American River for power, irrigation and flood control above Folsom as designated, except that in considering the South Fork of the American River no consideration should be given to existing and proposed developments of the Western States Gas & Electric Company and the Eldorado Power Company, inasmuch as these projects are already covered by license from the Federal Power Commission.

2. Trinity River Diversion. Applications are on file with the commission for the construction of storage reservoirs and power projects on the upper Trinity River, for the diversion of the waters therefrom into the Sacramento Basin and for the construction of storage reservoirs and power plants after such diversion, the waters so diverted to be used eventually for irrigation in the Sacramento Valley. It is desired that the board investigate the effect of such proposed diversion upon power development on the remainder of the Trinity River, upon irrigation and fishing interests along that river and upon navigation at the mouth of the Klamath. It is also desired that the board review the proposed plans for development within the Sacramento Basin, and finally, that it reach conclusions as to whether in view of all the interests involved it is desirable that such diversion be authorized.

3. North Fork of Stanislaus River. The commission has before it an application contemplating the creation of storage on a tributary of the North Fork of the Stanislaus River for use in connection with existing canals and power plants in the vicinity of Angels and Murphy. It appears probable that a development such as proposed is not economical and might seriously interfere with the complete development of the stream. The present diversion through the old mining ditch cannot be changed because irrigation rights have grown up in the vicinity of Murphy and Angels which cannot be set aside. An increase in the amount of water taken through this ditch might set up new rights and make it impracticable to return the waters to the stream in a manner which would provide for the best utilization of the power. It is desired that the board review this situation, investigate the various interests involved, and report to the commission what plan of development will, in its judgment, be best suited to make a complete utilization in the public interest.

Former Secretary Fall Has Electrified Ranch

Albert B. Fall, former United States Senator and Secretary of the Interior, has just finished installing a hydroelectric plant and power transmission system upon his ranch at Three Rivers, N. M. It is now said to be the most modernly equipped ranch in the matter of light and power in the country. Although the plant was installed primarily for the purpose of furnishing power for pumping water for irrigating a large tract of cultivated land upon the property, the electrical energy is transmitted to the various buildings. The plant is of 75 hp. capacity. The water is diverted about half a mile above the mouth of Three Rivers canyon and then carried two miles through concrete and steel pipe to the power house, where it produces a pressure of 226 lb. at the nozzle of the Pelton wheel. Should the water get low in the river, a big Diesel engine is in reserve to furnish power. The energy is carried to the junction of Three Rivers and Indian Creek, where there are a number of wells. More wells are to be drilled and equipped with modern pumping plants.

Boston Edison Expansion

Station Development Problems Debated and Plans Explained at Providence Meeting

ASPECTS of the Edison Electric Illuminating Company of Boston's generating-plant development problem were reviewed at a recent meeting of the Providence Engineering Society by George E. Seabury, superintendent station engineering department. The expansion of the L Street station in South Boston from its original design of 1903 for twelve 5,000-kw. turbogenerator units to a rating of 186,000 kw. in the fall of 1923 marks the limit of this installation unless some of the older units are removed. About eight years ago the company began studying new plant developments, and on the site of the new Weymouth station sixty-three acres will soon be available for future requirements. Present plans provide for about 300,000 kw. at Weymouth, the initial installation to be two 30,000-kw. units.

Brief announcements have been made as to the contemplated use of 1,000 lb. to 1,200 lb. steam pressure in a portion of the Weymouth equipment. Preliminary studies of high-pressure possibilities showed that if a maximum steam temperature of 700 deg. F. were adopted on account of the limitations of the steels now on the market, very attractive economies could be secured with pressures of 1,000 lb. to 1,200 lb. A basic pressure of 375 lb. is contemplated for the 30,000-kw. units at Weymouth. Directly connected to one of these will be a high-pressure turbine to operate at 1,000 lb. or over, exhausting into the 375-lb. main feeding the larger unit. The high-pressure unit will exhaust into a reheater which forms a part of the high-pressure boiler equipment. It is planned to install one boiler to operate at 1,000 lb. to 1,200 lb. pressure and three boilers to operate at 375 lb., the latter serving one 30,000-kw. and the former one 2,000-kw. unit. As is now indicated, the high-pressure boiler will be built for use with a steel-tube economizer. At 1,000 lb. steam pressure it will deliver 110,000 lb. of steam per hour and at 1,200 lb. 133,000 lb. of steam per hour. The Edison company's engineers are of the opinion that it is unsafe to go to a steam temperature as high as 800 deg. F., since above 700 deg. the strength of steel falls off rapidly. It is possible that a maximum of 725 deg. may be attained.

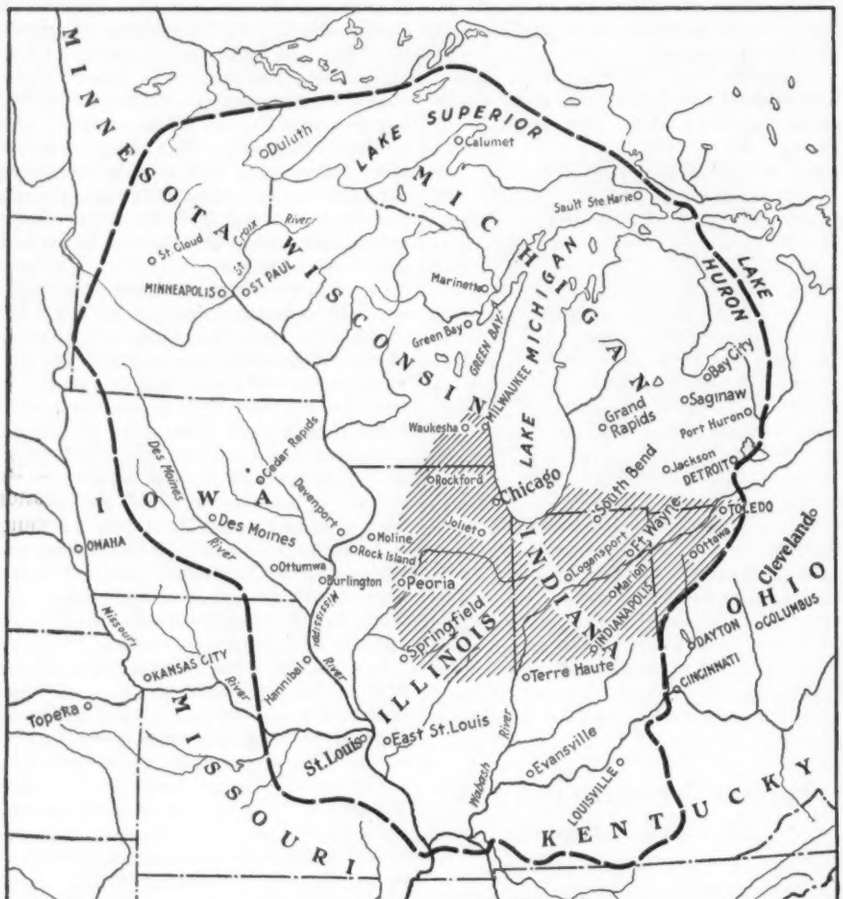
ADVANTAGES OF WEYMOUTH SITE

Unusually good facilities for handling heavy machinery and materials in bulk are available at Weymouth. The Fore River shipyard of the Bethlehem Steel Corporation is opposite the station site. The plant will add many million dollars to the taxable valuation of Weymouth. Fresh-water make-up may require separate piping facilities from the system of the Metropolitan District Commission. The coal-storage capacity is being figured on the basis of one ton

per kilowatt of station rating. Two coaling towers of 400 tons per hour rating each will be installed at first, followed by a third. Heavy machinery can be delivered directly to the plant from lighters and then moved into place.

On the electrical side it is planned to use 14,000 volts on the main buses and 2,300 volts for station service. A 2,300-volt steam turbo-generator will be provided for emergency service, but auxiliaries will be motor-driven and the heat balance maintained by bleeding steam from the main units. These are to be of 85 per cent power factor, and the switch house will be built with a closed-ring bus layout, sectionalizing by bus tie switches and providing for a transfer bus. Vertical separated phases will be used. The site affords ample room for switching equipment, and the completion of the station will probably be associated with the addition of a high-voltage loop system of transmission lines connecting the more important substations at the west of Boston with Weymouth and L Street. Before construction work was begun an exhaustive study was made of fuel oil and pulverized coal for possible use at Weymouth, but the present status of the market, outlook for future supply, cost of auxiliary apparatus and installation expense, uncertainty as to maintenance costs and positive experience of the company as to the performance of underfeed stokers burning bituminous coal contributed to the decision to pass by these other methods for the present.

Development Plan of Great Lakes Sections, N. E. L. A.



MAP OF PROJECTED NINE-STATE POWER SURVEY, SHOWING PORTION TO BE FIRST DEVELOPED

THE first report of the power survey committee of the Great Lakes Division, N. E. L. A., noticed in the ELECTRICAL WORLD for May 19 (page 1166) and now available for distribution, gives, as stated in that issue, the outlines of general development which would supply the future power needs of the Great Lakes territory most economically, to the end that all extensions planned now and in the future may be in conformity with a comprehensive plan.

The method of procedure to be followed is somewhat as follows: Growth both in population and industrial development will be estimated for the various portions of the area, all economic conditions, such as rail and water transportation and accessibility to coal fields, receiving due weight; the general locations of "capital stations" —plants with a capacity of 200,000 kw.—will then be planned and trunk lines and secondary distribution circuits will be considered. The committee is looking into the future up to 1950.

The general territory under consideration reaches from Detroit on the east to the southern watersheds of the Ohio River, thereby including Louisville; thence extends westward to take in St. Louis, Des Moines and Minneapolis and swings across upper Michigan back to Detroit, including or impinging on nine states. The area for immediate study will have Chicago as a center and include Milwaukee, Peoria, Springfield (Ill.), Indianapolis, Detroit and South Bend. This is the shaded area on the map. H. H. Field has been chosen as engineer-secretary to handle this work, with offices in the Edison Building, Chicago.

Trip Up Big Horn Canyon

Interior Department Engineers Report on Its Potential Water Power in Wyoming and Montana

THE potential water power of Big Horn Canyon in Wyoming and Montana and its utilization are considered in a report just prepared by Benjamin E. Jones and David J. Guy, hydraulic engineers of the Department of the Interior. The two engineers made a trip through the canyon in 1921. Their report is based on information obtained on the trip, on topographic maps of the canyon prepared by A. W. F. Koch of Hardin, Mont., engineer of the Big Horn Canyon Irrigation & Power Company; on stream-flow records obtained at Hardin, Mont., for the period 1905 to 1920, and on other information available in the Interior Department.

In the stretches above and below the canyon the Big Horn flows through broad basins in which there are irrigated lands on both sides of the stream and bench lands farther back. The canyon itself lies in a huge fold of the rock beds that form the north end of the Big Horn Mountains. Through this fold the river has cut its winding way in a deep, narrow gorge 50 miles long, which begins 8 miles south of the Montana-Wyoming boundary. A trip on this stream involves real peril.

Big Horn River falls 450 ft. in the canyon and has a flow of 1,500 second-feet for 90 per cent of the time and 2,475 second-feet for 50 per cent of the time. Without storage the potential power for 90 per cent of the time at 70 per cent efficiency is 54,000 hp. and for 50 per cent of the time it is 89,000 hp. Suitable dam sites are numerous and can be developed economically as soon as a market for the power is available.

The Big Horn Canyon Irrigation & Power Company proposes to build a dam near the mouth of the canyon to a height of 480 ft. above the foundation and 450 ft. above the low-water surface of the river. Such a dam would utilize the entire fall in the canyon, and if the upper 200 ft. of the reservoir were used to store water the total flow of the river in years of low water could be equalized and a continuous flow of 3,100 second-feet obtained. The dam would make available 84,600 hp. con-

tinuously. The proposed capacity of the turbines is 165,000 hp. It is also proposed to take water from the reservoir at a point 200 ft. above the river and carry it by canals down both banks to irrigate 60,000 acres of bench land between the canyon and Hardin, Mont.

The report considers plans for developing the potential power of the canyon by one, two and three dams and points out the advantages and disadvantages of each plan.

Its publication may be delayed, and to make the data immediately available to the public manuscript copies have been placed on file at the office of the Geological Survey in Washington, D. C., and at the office of the district engineer in room 52, Montana Bank Building, Helena, Mont., where they are now open for inspection.

For Interstate Connection

New York Commission Authorizes Adirondack-New England Tie —Sanctions Hydro Plant

THE Public Service Commission of New York granted permission to the Adirondack Power & Light Corporation on Tuesday to construct a transmission line through portions of the towns of Stephentown, North Greenbush, Nassau and Sand Lake, Rensselaer County. The transmission line is to be constructed under franchises obtained from the town boards of those towns. The order of the commission provides that no electrical energy shall be sold or distributed by the Adirondack Power & Light Corporation either directly or indirectly in any of the towns through which the said line will pass.

The memorandum on which this order was granted shows that the transmission line will furnish a connecting link between the distribution lines of the Adirondack Power & Light Corporation and those of the New England Power Company. The line will be used for the transmission of energy between those two companies as needed.

PERMIT FOR NEVERSINK DEVELOPMENT

The commission also granted to the Oakland Power Company permission to construct a hydro-electric plant on the Neversink River. The plant will be in the towns of Forestburgh, Thompson and Mamakating, Sullivan County, and in the town of Deer Park, Orange County. No transmission line will be constructed by the company as all electrical energy will be sold at its switchboard to other electrical corporations authorized to purchase and transmit it.

The commission approved an application of the Mutual Electric Company and the Hornell Electric Company for consent to the transfer of the franchises and electric plant of the first-named company to the Hornell company. The order also approves an operating contract entered into between the two companies and permits the Hornell company to construct an extension of its electric plant in the towns of Hornellsville and Dansville under franchises which have been received from the local authorities.

Granite Men to Pay Increased Rate to Montpelier Company

Withdrawal of opposition to a 15 per cent average power-rate increase by granite manufacturers served by the Montpelier & Barre (Vt.) Light & Power Company will, it is thought certain, result in approval of the advanced rate by the Vermont Public Service Commission. For more than a year the company deferred filing increased rates because of unsatisfactory economic conditions prevailing in the granite industry, which is the largest consumer of power in the territory. For some time, however, the company has been barely able to pay its fixed charges and operating expenses, and since July, 1921, it has paid no dividends. It therefore made an increase of half a cent per kilowatt-hour for power service, effective April 1, 1923. At a hearing before the commission the point was made that lack of credit made it impossible for the company to borrow funds to complete the installation of a 2,500-kw. steam turbine unit for which foundations had been prepared and that other important work had to be held in abeyance because of the inadequate net earnings of the company. Following this frank statement came the information that the manufacturers' association was prepared to withdraw its opposition.

New England Power to Replace Older Units at Vernon

To obtain greater efficiency in the use of water at the Vernon (Vt.) station of the New England Power Company, it has been decided to replace four of the original 2,500-kw. three-runner vertical generating units with 3,000-kw. two-runner units. One of the new units will probably be installed yearly, beginning on the New Hampshire side of the Connecticut River.

When the Vernon station was originally built eight 2,500-kw. units of the three-runner type were installed, the plant being placed in operation in 1909. The operating head was 35 ft. and the flood rise of the river about 30 ft. The three-runner design and the type of gate rigging and control then available for low-head plants led to high cost of maintenance, difficulty in keeping the equipment up to capacity and difficult accessibility at the lowest wheel of each unit. With the growth of the system the maximum short-time peak capacity of the station became needed, with the possibility of operating some units at light load as motors for power-factor correction without water loss, and in 1921 the plant was extended by the installation of two 4,200-kw. single-runner vertical units. These units can be motored with the headgates open and wheel gates closed with minimum leakage and still be ready to supply power on short notice.

Public Utility Advertising

First Meeting of New Association Draws Out Excellent Papers at Atlantic City

THE sessions of the first annual convention of the Public Utilities Advertising Association, held at Atlantic City on Tuesday last in connection with the convention of the Associated Advertising Clubs of the World, were attended by representatives of the national utility associations and state committees on public utility information and by delegates controlling the public relations, advertising and publicity departments of many individual public service corporations. A remarkably good program was presented. B. J. Mullaney of Chicago was chairman of the morning session and Frank Leroy Blanchard of New York chairman of the afternoon session.

Mr. Mullaney outlined the needs of advertising in the four major utility industries as follows: (1) Service advertising, to gain volume by exploiting advantages and uses of the service; (2) merchandise and appliance advertising, in the case of electric and gas companies, to sell goods at retail; (3) financial advertising to sell the securities that must be issued to provide extensions and additions to plant and equipment; (4) institutional advertising to lend background to the other three.

Grover C. Maxwell of Columbus, Ohio, former secretary of the Ohio Public Service Commission, emphasized the urgent need of a proper balance between straightforward, honest advertising and authoritative and interesting news articles, together with forceful and truthful public speaking, as the best way of telling the public the real story of the public utilities. James O'Shaughnessy expressed the view that there is an exceptionally valuable opportunity for economic co-operation between the utility companies and the advertising agencies.

W. S. Vivian, director of public relations of the Middle West Utilities Company of Chicago, stressed the great importance of getting the public to realize that the problems of the utility are the problems of the public. J. C. McQuiston, manager of the publicity department of the Westinghouse Electric & Manufacturing Company, laid emphasis on the necessity of friendly relations between the companies and the newspapers.

Francis H. Sisson, vice-president of the Guaranty Trust Company of New York, read a paper on "Public Utilities and Public Relations," dealing with the power of the printed word and the value of good will and advertising as factors in economic education.

W. H. Hodge, of H. M. Byllesby & Company, discussed the practical side of customer-ownership advertising. Chairman Blanchard spoke of the value of the new association and explained the methods and machinery of a well-organized and effectively functioning department of public relations.

War Department's Tests Rank Moody Draft Tube High

At the suggestion of Hugh L. Cooper, the Corps of Engineers, United States War Department, recently undertook a series of experimental tests of great interest to hydraulic engineers and others concerned with hydro-electric power development. The object of these tests, which have just been completed, was the confirmation of the data upon which the department had based its decision to employ the Moody spreading draft tube in the Muscle Shoals power station, but it was decided to make the tests comprehensive in character, with a view not only to obtaining authoritative data regarding the relative efficiencies of various draft-tube designs, but also to making possible an estimate of the actual capital savings represented by improvements in draft-tube efficiency, and to compare these with the increase, if any, in construction cost which might be incurred by installing the most efficient type.

This latter point was of especial interest to Colonel Cooper, and as the War Department placed the supervision of all the tests in the hands of his firm, the result was the collection of a body of data which not only forms a very important contribution from an authoritative and impartial source to present hydraulic engineering knowledge, but should, it is thought, also result in the possibility of considerable capital savings in forthcoming hydro-electric power enterprises. All the tests were carried out in the I. P. Morris laboratory of the William Cramp & Sons Ship & Engine Building Company at Philadelphia, which was loaned to the War Department by that company for the purpose. In every test, the I. P. Morris representatives announce, the Moody tube showed highest efficiency under all conditions and entirely vindicated Colonel Cooper's judgment in its selection.

The report includes a graphic representation of the tests in a series of curves plotted under varying conditions of effective head, turbine speed and load, showing turbine efficiency and power output for each type of tube. In all, without exception, the Moody type shows a clear lead over any other design. It is understood that a complete report is now in preparation and will soon be published.

Santee River Project Will Be Pushed

Final plans are being prepared by T. C. Williams, vice-president of the Columbia Railway & Navigation Company, covering the project which involves the diversion of the Santee River through a canal 15 miles long to the Cooper River, near Moncks Corner, above Charleston Harbor, S. C. The plans are being perfected with the aid of engineers of the Foundation Company.

Recent investigations have shown that this project is more attractive than was supposed at first. It has the backing of a very active local sentiment. An application for license will be made in the near future. The tentative plans provide for an initial diversion dam which would develop a head of 55 ft. and an initial installation of 30,000 hp. to 50,000 hp. Provision will be made for the construction later of a dike and a higher dam which would raise the head to 70 ft. and permit of an ultimate development of 150,000 hp. In that connection it is pointed out that there are few points on the flat coastal plane where such a high head could be obtained. The feasibility of the project is enhanced by the progress of hydro-electric development on the upper tributaries of the Santee, such as that of the Southern Power Company on the Catawha and Congeree. These reservoirs in recent years have raised the low flow of the Santee from 3,000 cu.ft. to 10,000 cu.ft. per second. The contemplated development will go much further toward flattening out the high-water flow and raising the low-water discharge.

The success of the project depends to a considerable extent on the amount of flow which the War Department will insist must pass the dam to maintain navigation on the Santee below the point of diversion. The city of Georgetown, on the coast, is vitally interested in keeping this navigation channel open, although it is not used at present. The power company hopes to obtain permission to divert all of the Santee with a proviso that whenever the Secretary of War directs a minimum discharge of 3,000 cu.ft. per second will be allowed to pass. It is believed that this proviso would meet the requirements of navigation were it established.

A. S. M. E. Hears of Canada's Water Power

Hydro-Electric Possibilities of Quebec Are Put at 13,000,000 Kw. and Those of Ontario at 6,000,000 Hp.—A New Fuel Described—Proposed Steam-Boiler Code

A GLOWING outline of the vast potential water powers of Quebec and Ontario was exhibited to the Montreal spring meeting of the American Society of Mechanical Engineers last week by Julian C. Smith, general manager of the Shawinigan Water & Power Company, who spoke for Quebec, and Frederick A. Gaby, chief engineer Hydro-Electric Power Commission of Ontario, who represented the latter province.

Pointing out that Quebec's area of 706,804 square miles is about one-fifth that of the United States, Mr. Smith said the province contained actual possibilities for developing 13,000,000 kw. to 15,000,000 kw. continuously. At present the economic possibility for development is 5,250,000 continuous kilowatts, of which 800,000 kw. is now available. The principal water powers are on the Ottawa, St. Lawrence, St. Maurice, Saguenay and St. Francis Rivers. Cedars Rapids will develop 229,000 hp. in the near future, and Shawinigan and other stations now supply 157,000 electrical horsepower to the paper industry. Mr. Smith described the Duke-Price project on the Saguenay, where Lake St. John, at the head of the river, serves to control flow and act as a reservoir. The watershed is over 30,000 square miles in area, and there is a 300-ft. fall in a distance of 25 miles. Four hundred thousand horsepower will be eventually developed at the source of the Saguenay and 800,000 hp. farther down. A 400,000-hp. plant will be in operation in two or three years. On the St. Maurice the Shawinigan company is installing 65,000 hp. in four units, and on the Ottawa River 600,000 hp. will be available before 1924. Quebec has a total of 1,070,000 electrical and hydraulic horsepower developed, and growth curves indicate the need for the entire 7,000,000 possible horsepower within twenty-five years. Philip S. Gregory, who read the paper for Mr. Smith, said that surplus water power was used for electric boilers in several plants, but that energy would have to sell at about 2 cents a kilowatt-hour before it could compete with ten-dollar coal for such purposes.

ONTARIO WATER POWER

Mr. Gaby put the potential water power of Ontario at 6,000,000 hp., of which 1,300,000 hp. has been developed. He said that estimated ultimate development was only approximate because of the many variable factors encountered and the incomplete data. In Ontario, with an area of 400,000 square miles, the St. Lawrence and the Niagara afford the greatest power, with some on the Nipigon and some on the smaller rivers in the north and central portions. The Hydro-Electric Power Commission, which acts as trustee for 350 municipalities, has developed 625,000 hp. and operates 3,500 miles of transmission lines. Mr. Gaby said. The longest line is 254 miles to Windsor, and 110,000 volts at 25 cycles is the system voltage. At the present rate of growth the system needs 100,000 hp. to 150,000 hp. more capacity each year. The commission operates interconnected districts in central Ontario and one system on the Nipigon. On the Niagara system there is at present 540,000 hp. and will be ultimately 820,000 hp. In the Severn district there is 6,000 hp. and the same amount in the Eugenia district. In central Ontario 40,000 hp. is in operation, and in the Nipigon region there is an ultimate possibility of 200,000 hp. On the St. Lawrence there are two possible sites, in the opinion of Mr. Gaby—at Morrisburg, where 600,000 hp. to

800,000 hp. can be obtained, and at Cornwall, where 1,200,000 hp. can be developed. On the Nipigon 200,000 hp. can be obtained from sites at Virgin Falls, Cameron Falls and Alexander Landing.

The commission now has 628,000 hp. in operation and has utilized the capacity available from the streams without storage. The system is well loaded and as a result steps are being taken to arrange for storage capacity to insure more power. Another million horsepower is expected from Niagara and 1,500,000 hp. from the St. Lawrence, but the load curve indicates that this power will be used at the end of ten years.

Load Doubles in Six Years

In discussing the papers W. M. White, Allis-Chalmers Manufacturing Company, pointed out that standards of living and wages were fixed by the per capita use of power and that all possible power should be used immediately by those ready for it. Fred Darlington, Westinghouse Electric & Manufacturing Company, observed that interconnection and steam supplementary stations were needed to give economical power to industry and advocated the immediate development of water powers in order to avoid waste of energy and to conserve fuel. John R. Freeman thought that statesmanship and foresight were needed to anticipate power demands and complimented the Dominion government on the foresight shown by the water-power department. Mr. Gregory, in closing, stated that the load doubled every six years in Quebec and that interconnection helped greatly in obtaining better system operation by taking advantage of stream-flow variations in different sections.

A New Fuel

A paper on "Lignite Char" was read by O. P. Hood of the United States Bureau of Mines. Mr. Hood explained that lignite char is a lignite which has been dried and distilled in an oven especially designed for this purpose. About 2½ tons of raw lignite reduce to one ton of char, the heat value of which is about 12,000 B.t.u. per lb. Unlike the German brown coal, the American lignites do not briquet well without the addition of a binder, and the Bureau of Mines has therefore been led to investigate the possibilities of an inexpensive carbonizing process and the use of the resulting char direct without briquetting.

The boiler code committee held public hearings for the discussion of proposed rules for the care of steam boilers in service and a proposed code for the inspection of steam boilers. As in the case of the power-equipment code and the internal-combustion-engine code referred to last week, co-operation with the appropriate committee of the N. E. L. A. will be sought.

About 250 engineers from the United States attended the convention, which was held in conjunction with the Engineering Institute of Canada. A number of interesting trips of inspection were made. Fred R. Low, editor of *Power*, was nominated as president for the ensuing term.

Powerdale Plant Starts

New Power House of Pacific Power & Light Company at Hood River, Ore., Goes Into Service

THE new Powerdale hydro-electric plant of the Pacific Power & Light Company at Hood River, Ore., was started with appropriate dedicatory exercises on May 10. President Guy W. Talbot in welcoming the visitors said that about 25 per cent of the capital invested in the plant came from the sale of securities in the local market.

The plant is built in a beautiful canyon on the Hood River, just outside the city of Hood River. The intake work for the pipe line is 3 miles farther upstream. About 3 miles above the generating station a concrete diversion dam is constructed across the river. The 8,700-hp. vertical-type turbine, designed for 180 ft. head and 360 r.p.m., was manufactured by the I. P. Morris Department of William Cramp & Sons. The upper end of the turbine shaft carries the Westinghouse three-phase, 60-cycle, 7,200-volt generator and its exciter. A Kingsbury bearing above the generator carries the weight of the unit. Lubrication is provided by means of a water-cooled, forced-circulation oiling system. The output of the unit is rated at 6,000 kw. at 80 per cent power factor, or 7,500 kva. The switching is handled by a twelve-panel, remote-control switchboard supplied by the General Electric Company.

The generating and switching equipment are housed in a remarkably small building. The power house is only 47 ft. x 82 ft. x 17 ft. high and is constructed of hollow-tile concrete plastered. To facilitate repairs to the turbine and generator unit, two large hatches are provided in the roof, one directly over the generating unit and the other over a spare room where repair work can be carried on. A large 40-ton gantry crane straddles the power house and serves to lift the heavy equipment through the roof hatches.

An outdoor type of transformer substation is used, three 2,500-kva. self-cooled, oil-insulated, radiator-type Westinghouse 6,600/66,000-volt transformers being mounted on a raised concrete platform adjacent to the power house.

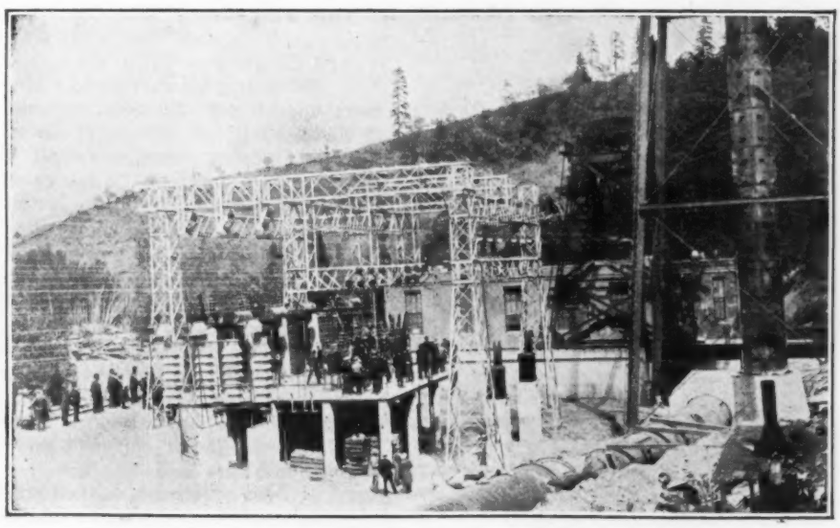
Final surveys for this plant were made in May, 1922, and actual construction work started about June 1. Credit for its rapid completion is due in a large measure to H. H. Schoolfield, chief engineer for the Pacific Power & Light Company, and J. E. Shinn of the Phoenix Utility Company, who was superintendent of construction on this work.

New York to Have Electrical Board of Trade

The Electrical Board of Trade of the City of New York, representing every branch of the electrical industry, was formally organized last week in the office of Arthur Williams, general commercial manager of the New York Edison Company. Mr. Williams is president and the chairman of the board is Charles L. Eidlitz, the recently appointed "Czar" of the electrical contracting business in Greater New York.

The Electrical Board of Trade was organized as the result of conferences of representatives of the electric light and power companies, telephone and telegraph companies, manufacturers, jobbers, contractors, distributors and dealers. It will act as a clearing house for credits and other information desired by the trade, but, it is announced, will not in any way deal with prices.

The officers elected, besides Mr. Williams and Mr. Eidlitz, were: Vice-presidents, Walter J. Drury of the Western Electric Company, William C. Peet of the Peet & Powers Company and Theodore Beran of the General Electric Company; treasurer, John P. Ryan, Cleveland & Ryan, and secretary, John MacIntyre.



Outdoor Substation, Venturi Meter and Surge Pipe in Foreground; Generating Station in Background

Pressure at 3,200 Pounds

This Will Be Feature of a Plant Now Being Built at Rugby for English Electric Company

AN EXPERIMENTAL superpressure steam plant now nearing completion, designed by the Benson Engineering Company of London and soon to be erected in the works of the English Electric Company at Rugby, England, is to employ a pressure of 3,200 lb. per square inch and will have a temperature of 706 deg. F. The heating elements are of very small section and have no steam drums or chambers. Steam will be generated at a pressure above that named, then throttled to 1,500 lb. and, after being superheated to 788 deg. F., will be passed through a high-pressure turbine exhausting at 200 lb. per square inch. The exhaust of the high-pressure turbine is to be reheated to 662 deg. F. and then expanded in a standard normal-pressure turbine to 29-in. vacuum.

The builders of the plant predict not only that it will consume about 28 per cent less fuel than a high-grade plant of the same capacity operating at 250 lb. pressure, but that it will also be cheaper to build and maintain. The plant is declared to be equivalent to a 1,000-kw. commercial plant. The great jump from 1,500 lb. pressure, the highest previously employed, to 3,200 lb. is due entirely to the fact that at any pressure below 3,200 lb. latent heat must necessarily be added, with consequent troubles from boiling and priming.

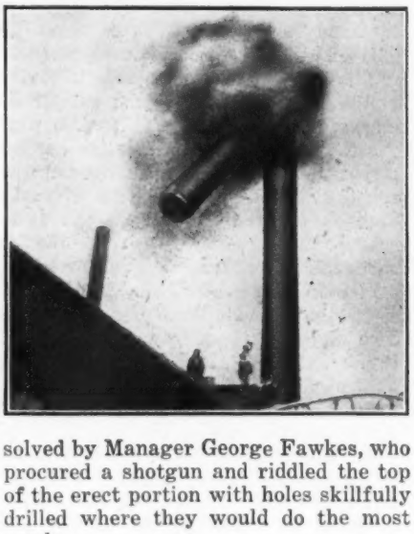
Brief News Notes

Another Metermen's Course. — The third short course for metermen conducted by the electrical engineering department of the University of Illinois is to be held on June 11-16. Two courses of instruction have been prepared, one for men who have had little or no experience in meter work and one for more advanced men.

Brookfield Rejects Municipal Ownership.—The people of Brookfield, Mo., had an opportunity to express themselves last month on the question of substituting a municipal electric plant for the privately owned central-station plant of the North Missouri Power Company. The result was overwhelmingly in favor of continuance of the privately owned plant, the vote standing: For municipal ownership, 250; against, 1,042.

Denver Tramway Purchases Two 10,000-Kw. Turbines. — The Denver Tramway Company has purchased two 10,000-kw. turbines from the government which will be installed in its steam plant at Denver. The machines are to be ready for operation by Aug. 15. The installation of these two new units will bring the company's generating capacity up to 30,000 kw., and it will no longer need to purchase power from a local power company.

Shooting Holes in a Smokestack.—Nowhere is the resourcefulness of the public utility operator more often shown than in the small community. The Richmond (Ky.) plant of the Kentucky Utilities Company has one smokestack for three boilers. A windstorm crumpled the stack so that smoke could not pass through it, and to maintain service it was necessary to create a draft in some manner until such time as the hanging portion of the stack could be removed. The problem was



solved by Manager George Fawkes, who procured a shotgun and riddled the top of the erect portion with holes skillfully drilled where they would do the most good.

University to Install 30-Hp. Turbine Wheel.—The University of California has recently ordered from the Pelton Water Wheel Company of San Francisco a 30-hp. impulse turbine for use in the hydraulic laboratory of the College of Mechanics at Berkeley. The turbine, which will be installed before the opening of the fall semester, will operate under heads up to 300 ft. It will be provided with a hand-operated needle nozzle and governor-controlled jet deflector.

Metermen's School Held at University of California. — A short course for metermen was given from May 14 to 19 at the University of California at Berkeley. The course was arranged through the co-operation of the meter committee of the Pacific Coast Electrical Association, the power companies and the extension division of the university. The course included technical lectures, recitations and laboratory work. It will be made an annual event.

Los Angeles Company's New Office Building.—A site for the new office building of the Los Angeles Gas & Electric Corporation has been purchased by the company. According to William Baurhyte, vice-president and general manager, the building, which is to cost $1,250,000, will be of sufficient size to accommodate the company for many years. It will contain an assembly hall for meetings between officials and employees and for employees' organizations. Construction is to be pushed.

Pacific Power & Light to Build Interstate Line.—One of the important construction jobs to be undertaken by the Pacific Power & Light Company this year is a transmission line from Kennewick, Wash., to Umatilla, Ore., and thence on to Pendleton, Ore. Power will be wholesaled to the Hermiston Light & Power Company, operating in northeastern Oregon. Surveyors are now in the field locating the line.

Dothan's Municipal Plant Meets Obstacle.—Court action threatens to hold up the erection of a municipal hydroelectric plant at Dothan, Ala., the allegation being made that a sale of bonds was illegal. Pending the hearing of the petition for an injunction work is proceeding on the plant, which is being erected on the Choctowhatchee River, about 20 miles from Dothan, and will, it is said, cost $900,000. Dothan has a population of 12,500 and is in the extreme southeast of Alabama.

Lighting Alleys Reduces Burglaries in Denver.—Lighted alleys, made possible through a new city ordinance, are gradually decreasing the number of burglaries and hold-ups in the downtown district of Denver and are giving protection to the policemen on downtown beats. "Before the lights were installed there was an average of two burglaries a night in the business district," declares a high police official, "but in the week after the lights were installed we had only two burglaries in the section." The lights are 100 ft. apart.

Use of Kilocycles in Radio.—In accordance with the recommendation of the second national radio conference, the Department of Commerce and other government departments will hereafter follow the practice of specifying radio waves in even values of kilocycles rather than in meters. The relation between the two is indicated by the following rule: "To obtain kilocycles, divide 300,000 by the number of meters; to obtain meters, divide 300,000 by the number of kilocycles." The reason that kilocycles are coming into use and displacing meters is that the necessary separation of the frequency of transmitting stations to prevent interference is the same, no matter what the frequency may be. This necessary separation is variable and quite misleading when expressed in meters.

Okanogan Power Line Completed.—Completion of the power line connecting the Washington Water Power Company's main system with its new field in the Okanogan territory has been announced. This construction includes 58 miles of 60,000-volt main transmission line, running from Coulee west to the Columbia River and north along the west bank of the river to Brewster. It will convey power from the main system of the Washington Water Power Company into the 33,000-volt lines of the Okanogan Valley Power Company, acquired by the Washington Water Power Company the first of the year. In addition to the 60,000-volt line 18 miles of 13,000-volt distribution line

was built into the Lake Chelan district, with arms extending on both sides of the lake.

Five New Jersey Companies Are Consolidated.—The merger of five corporations into the Central Jersey Power & Light Company, having an appraised valuation of $6,275,800 and serving 100,000 population in forty-two cities and municipalities, has been announced by the A. E. Fitkin Company of New York. In the amalgamation are the Morris & Somerset Electric Company, the Lakewood & Coast Electric Company, the Toms River Electric Company, the Lakewood Water Company and the Commonwealth Electric Company of Summit. J. H. Drake will be vice-president and general manager, with headquarters at Boonton, N. J.

Mining Helps Hydro-Electric Expansion in Utah.—That railway and metal-mining expansion in Utah will bring about a rapid development in hydro-electric projects is indicated by activity already under way in the southeastern part of the state. The Dixie Power Company is planning the construction of two new water-power plants and one steam plant to take care of an anticipated increased demand. The new sites, already in the company's control, are in the Pine Valley Mountains. It is believed that the present capacity of plants in operation, which is about 1,000 hp., will be entirely inadequate when the iron smelters now being constructed begin production. The new plants will bring the total capacity to about 6,000 hp. This will provide sufficient power to meet the present and future needs of the Cedar and Parowan Valleys.

Diesel Electric Tanker Successful.—Trials of the Standard Oil Company's first Diesel electrically driven tanker were completed off San Francisco last month and were eminently successful. The normal speed of the propeller is 130 r.p.m., but during the trial it was operated at about 145, and the load was less than 1,000 amp., whereas full load rating on the motors is 1,065 amp. The change from full speed ahead to reverse took from ten to twelve seconds. The tanker's propelling units consist of two General Electric 300-hp. motors mounted on the same base and with a common shaft and driving a single propeller. Energy is supplied by two General Electric 245-kw. direct-current generators with a 30-kw. exciter connected to each, each generator and exciter being directly connected to a 400-hp. six-cylinder Diesel engine.

For Better Lighting in the Schools.—Announcement of the personnel of the sectional committee which is to prepare a lighting code for the nation's schools under the auspices of the American Engineering Standards Committee, with the American Institute of Architects and the Illuminating Engineering Society as joint sponsors, is made by the Federated American Engineering Societies. Among the members are C. E. Clewell, representing the American Institute of Electrical Engineers; Ward Harrison, the National Electric Light Association; W. S. Little and M. Luckiesh, the Illuminating Engineering Society; M. G. Lloyd, the United States Bureau of Standards, and G. H. Stickney, the National Safety Council. Surveys and investigations are under way by various bodies. "Eyesight Conservation Day" has been inaugurated in several cities and systematic lectures to school children, particularly in New York and New Jersey, have been made a feature of the general plan.

Associations and Societies

New York Electrical Society.—Officers of this society for the coming year, as unanimously selected by the nominating committee, will be: President, Philip Torchio; vice-presidents, Alfred Cane, E. H. Clarke and Harry E. Kidder; secretary, T. C. Martin; treasurer, T. F. Honahan.

Los Angeles Section, A. I. E. E.—The annual field day of the Los Angeles Section of the American Institute of Electrical Engineers was held Saturday, May 19. The party was taken by automobile on a trip of inspection to the new Laguna Bell 220,000-volt substation of the Southern California Edison Company and the Arcadia automatic substation of the Pacific Electric Railway. Following a dinner in the evening at the California Institute of Technology, the visitors visited its electrical and physical laboratories.

Lehigh Valley Section, A. I. E. E.—On May 24 Prof. Vladimir Karapetoff of Cornell University spoke before this section at Bethlehem, Pa., on "Recent Electrical Research." He emphasized the necessity of "continuity of effort" in order to obtain results that are worth while and the importance of having research workers who are employed not to solve this or that particular problem, but to become specialists in a certain class of phenomena, so that they can skillfully and intelligently handle any problem within that domain.

Engineers' Club Formed at Hartford.—With 908 charter members "signing up" during a short period of work devoted to organization, the Hartford (Conn.) Engineers' Club has been formed to promote friendly intercourse and professional advancement. A committee is at work on the problem of permanent quarters, and the following officers have been elected: President, Hiram Percy Maxim; vice-presidents, Frank P. Gilligan and Edward W. Bush; secretary, Kenneth B. Warner; treasurer, Henry R. Buck; councilors, Robert Charles Cole, William F. Brooks, F. C. Moore and S. F. Jeter.

National Safety Council.—The Engineering Section of the National Safety Council will hold its second meeting of the year at Detroit, in co-operation with the Detroit Safety Council, on June 12. In the morning the subject of safety in welding and cutting will be discussed by experts representing the three modern methods—electric, gas and and thermit—followed by a practical demonstration of the use of goggles to protect against the injurious visible and invisible rays and a general discussion in which the industrial safety engineers in the audience will have opportunity to get information on their own particular problems.

Insull Addresses Chicago Electric Club.—Before a well-attended luncheon of the Electric Club of Chicago on May 29 Samuel Insull, president Commonwealth Edison Company, gave a comparison of the central-station industry in 1902 and 1922. Whereas the total investment of all central stations in the United States in 1902 was $650,000,000 with an annual income of $85,000,000, the respective figures for 1922 were $5,000,000,000 and $1,000,000,000, he said. The energy output for the same period had increased from 2,500,000,000 kw.-hr. to 52,000,000,000 kw.-hr. President Insull also dealt with the power development in the northeastern section of Illinois, which he estimated would require by 1927 a maximum demand of 1,300,000 kw., since the present demand is about 789,000 kw. He earnestly advocated the spread of customer ownership of securities.

Coming Meetings of Electrical and Other Technical Societies

[A complete directory of electrical associations is published in the first issue of each volume. See Jan. 6 issue, page 78, for latest list.]

California State Association of Electrical Contractors and Dealers—Dorner Lake, Cal., June 9-16.

Electric Power Club — Hot Springs, Va., June 11-14. S. N. Clarkson, Kirby Bldg., Cleveland.

Pacific Coast Electrical Association—San Francisco, June 19-22. S. H. Taylor, 527 Rialto Bldg., San Francisco.

North Central Division, N. E. L. A.—Minneapolis, June 20-22. H. E. Young, Minneapolis General Electric Company.

Society for the Promotion of Engineering Education—Ithaca, N. Y., June 20-22. F. L. Bishop, University of Pittsburgh.

Canadian Electrical Association — Montreal, June 21-23. Louis Kon, 65 McGill College Ave., Montreal.

Southern Appalachian Water Power Conference — Asheville, N. C., June 25-27. J. A. Switzer, Knoxville, Tenn.

American Institute of Electrical Engineers —Annual convention, Swampscott, Mass., June 25-29; Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

American Society for Testing Materials—Atlantic City, June 25-29.

Iowa Section, N. E. L. A. — Mason City, June 26-29. M. A. Linn, Des Moines Electric Co., Des Moines.

Associated Manufacturers of Electrical Supplies—New London, Conn., June 26-29. Frederic Nicholas, 30 East 42d St., New York.

National Council Lighting Fixture Manufacturers—Buffalo, June 26-28. C. H. Hofrichter, 233 Gordon Square Bldg., Cleveland.

Northwest Electric Light and Power Association—Seattle, June 27-30. G. E. Quinan, 204 Electric Bldg., Seattle.

Ohio Electric Light Association — Cedar Point, July 10-13. D. L. Gaskill, Greenville.

New England Division, N. E. L. A.—Swampscott, Mass., Sept. 6-8. Miss O. A. Bursiel, 149 Tremont St., Boston.

Michigan Electric Light Association—Grand Rapids, Sept. 11-13. Herbert Silvester, Detroit Edison Co., Ann Arbor.

Rocky Mountain Division, N. E. L. A.—Glenwood Springs, Col., Sept. 17-19. O. A. Weller, 900 15th St., Denver.

Association of Iron and Steel Electrical Engineers — Buffalo, Sept. 24-28. J. F. Kelly, 513 Empire Bldg., Pittsburgh.

Recent Court Decisions

Judge's Characterization of Electrical Installation as "Mantrap" Not Prejudicial.—A boy bathing was killed by contact with a live electric wire stretched on scows across a river for the use of a sand-pumping company, and the trial jury (Followill vs. Kansas Construction Company and Kansas Gas & Electric Company) found both the pumping company and the central-station company which furnished the energy guilty of wanton negligence. This verdict has been upheld by the Supreme Court of Kansas, which overruled exceptions taken to the charge of the trial judge and held that his colloquial characterization of an unguarded switch and uninsulated and sagging wires as a "mantrap" was not prejudicial to the defendants. (214 Pac. 430.)*

May Taxes Be Levied to Distribute Electricity to Rural Community?—Sustaining the lower court (Supervisors of Maricopa County vs. Faust) in finding unconstitutional an attempt of "Roosevelt Electrical District No. 3" to issue bonds under a defective state law intended to supersede others set aside by the courts, these bonds being for the alleged purpose of building transmission lines to supply residents of the district with electricity, the Supreme Court of Arizona refused to answer a question whether the distribution of electrical energy for domestic and power purposes to residents of a rural community fulfills such a public purpose that it may be done by means of funds provided by taxation. "An answer to that question in this case would settle nothing," the court said, "because it is not raised by the pleading and could not arise under the statute in question. Neither the act under which this district was organized nor the later one, under which it now assumes to act, deals with the distribution of electricity alone or even chiefly. None of these acts clearly and definitely defines the purpose for which districts are to be organized nor definitely limits the powers which are to be exercised." (214 Pac. 316.)

Police Power and the Fourteenth Amendment.—In Southern Bell Telephone & Telegraph Company vs. Town of Calhoun, a suit to restrain the enforcement of a state law requiring the installation of certain exchanges, the Federal District Court for the West District of South Carolina made a number of observations on the police power of the state in its relation to the Fourteenth Amendment of the United States Constitution, prohibiting confiscation. Among other things the decision said that the amendment does not prevent the state from exercising very extensive power in the regulation, taxation and policing of the business of a corporation, but permits a single foreign corporation to be expelled from the state by a special act and permits classification for the purposes of taxation to be resorted to; that in the matter of police regulation the powers of the state are exceedingly broad, and laws enacted for that purpose may be impolitic, harsh and oppressive without contravening the constitutional inhibition; that, however, a state legislature cannot single out a corporation, any more than a natural person, and subject it to burdens and liabilities which are not cast on others similarly situated, and that a joint resolution requiring a company to maintain telephone exchanges which it was not required to maintain by any provision of its charter or by any contract took the property of the corporation without just compensation. (287 Fed. 381.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

Complicated Rates Should Be Avoided in Small Communities.—In fixing rates for the Lapeer Gas-Electric Company, which combines steam heating with electric light and power service, the Michigan Public Utilities Commission dwelt upon the necessity of taking care not to make demand or connected load schedules for electric light and power in small communities so refined as to be unwieldy relative to the benefit secured by such refinement, where the cost of demand and connected load records will probably overbalance any benefit that might be gained as compared with a simpler rate schedule.

Commission Champions Right to Fair Return.—The Vermont Public Service Commission came out emphatically in its adjudication of an appeal brought by the city of St. Johnsbury against the New England Telephone & Telegraph Company against any contention that public utilities should be compelled to operate for less than a fair return. "That claim," the commission said, "if carried out, would result in the utter demoralization of all public service business and end in state ownership, a consummation devoutly to be avoided. Moreover, in considering whether a public service corporation is entitled to a return regard should be had for the people who have invested their money in the enterprise. Such a corporation may seem to be a great entity without soul or conscience, sucking the financial blood of its patrons for the mere pleasure derived from that process; but on further examination it will be found that the supposed sanguinary monster is but a legislative creation acting through its officers and agents for a large number of people in many walks of life who have paid into the corporation by way of stock investments sums of money for the double purpose of obtaining a revenue and aiding the enterprise. How long would the public continue to render such necessary financial assistance after a return was denied?" It was said further, in allowing a return of 6 per cent, which the commission termed moderate and conservative, that the maximum rate of return ought to be somewhat above what would be a fair average return, since the stockholders must stand their losses during poor years.

Rate Base Should Include Cost of Construction in Progress.—In defense of its inclusion in the rate base of the Pacific Telephone & Telegraph Company of a sum representing construction work in progress, the Department of Public Works of the State of Washington said: "Funds employed in construction work are as fully devoted to the public service as are funds invested in completed plant, in materials and supplies, or in the cash required to meet current expenditures. The necessity of an allowance for cash, materials and supplies and other items of working capital is recognized by all regulatory bodies and there is no question as to the propriety of permitting an earning upon these items in their final form when they appear as additions to the fixed capital accounts. Since 'construction work in progress' represents nothing more or less than cash and materials and supplies in their transitional stage between working capital and completed plant, it seems as clearly entitled to inclusion in the rate base as it was as working capital or as it will be as completed plant. There is, however, a further factor in this consideration, which is 'interest during construction.' Funds employed in construction work are entitled to a fair earning. If the funds be borrowed, the creditor is receiving an earning and the utility is suffering no loss since it is permitted to capitalize the interest it pays out. This capitalization creates a value upon which the utility is permitted to earn and which presumably can be sold if the plant changes owners. If the utility capitalizes interest on its own funds, there is an actual increase in its surplus. These facts must be recognized when considering the propriety of including 'construction work in progress' in the rate base. The rate of return from operations seldom coincides with the rate at which interest during construction is capitalized; furthermore, the applicant does not capitalize interest upon routine construction work requiring less than one month for completion. Therefore, the most equitable method of treatment appears to be to include 'construction work in progress' in the rate base and to include the interest accretions with operating income, which method acts as an automatic governor to compensate the ratepayer, if the rate of capitalization of interest be more, and the company if it be less, than the rate of return from operations."

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

B. C. Adams in Toledo

Benjamin C. Adams, vice-president and general manager of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., operated by Henry L. Doherty & Company, has been made vice-president and general manager of the Toledo Edison Company and president and general manager of the Community Traction Company at Toledo, Ohio. Mr. Adams is succeeding Frank R. Coates, who was president and general manager of both companies. Mr. Coates is retaining the presidency of the Edison company. The change marks the withdrawal of Mr. Coates from most of his active duties with the Toledo properties in the assumption of larger duties with Doherty and the Cities Service Company in New York.

Mr. Coates came to Toledo on Dec. 5, 1911, and ever since then has been in charge of the Doherty interests in Toledo. Mr. Adams is a comparatively young executive and has come up through the Doherty organization, having been in St. Joseph about five years. He has worked on a number of other properties.

T. B. Wilson, treasurer and assistant general manager of the Louisville Gas & Electric Company, has been elected a vice-president of the company.

R. F. Mullen, superintendent of the meter department of the Indiana General Service Company at Muncie, has been promoted to the office of commercial manager.

W. W. Finch, with office at Indianapolis, is to supervise and direct the appliance and merchandise sales of all the subsidiaries of the Central Indiana Power Company.

Charles Adams, assistant chief engineer of the El Paso (Tex.) Electric Company, has been transferred to the Columbus (Ga.) Electric & Power Company as chief engineer.

E. D. Freeman, district superintendent of the Oklahoma Gas & Electric Company at Sapulpa, Okla., has been transferred to Oklahoma City to assist J. M. Brown, district superintendent there.

W. S. Hodgson, formerly assistant secretary and treasurer of the Utah Power & Light Company, is now in New York with the Electric Bond & Share Company. R. H. Jones succeeds Mr. Hodgson with the Utah company.

G. W. Faller, for several years general manager of the City Light & Water Company of Amarillo, Tex., a Doherty subsidiary, has been transferred to Denver to head the Doherty Training School, which is directed by the Denver Gas & Electric Light Company. Mr. Faller was formerly connected with the Denver company, and his recent transfer carries with it the title of assistant general manager. He has been succeeded at Amarillo by Ross Philips, formerly secretary of the Lincoln (Neb.) Gas & Electric Light Company.

C. H. Champlain Works Manager at Sharon

C. H. Champlain, who has been assistant works manager at the East Pittsburgh works of the Westinghouse

C. H. CHAMPLAIN

Electric & Manufacturing Company, has been appointed works manager of the Sharon plant, which the Westinghouse company has recently acquired from the Savage Arms Corporation. Mr. Champlain entered the employ of the Westinghouse company in 1895 and has devoted his time continuously to works management. During the world war he had charge of the manufacture of shells. On Jan. 1, 1916, he was transferred to the Springfield works of the Westinghouse Electric Company as general superintendent, in which position he had direct charge of the manufacture of Russian rifles and Browning machine guns. In August, 1919, he was transferred back to East Pittsburgh, being appointed general superintendent of those works, and in February, 1920, he was appointed assistant works manager, in which position he continued until his present appointment.

M. L. Fawcett, general foreman of the transformer department, has been made superintendent of the new works. Mr. Fawcett has been associated with the Westinghouse company for twenty-four years.

A. L. Johnston, formerly associated with the electrical engineering department of the West Penn system at Pittsburgh, is now connected with the Electric Bond & Share Company, New York.

B. E. Torpen has been appointed to the engineering staff of the city of Tacoma to fill the post of hydraulic engineer in connection with that city's Lake Cushman hydro-electric project.

Roy H. Skill has been made district manager for the Pacific Power & Light Company at Pomeroy, Wash. Mr. Skill has been associated with the company since 1917.

L. A. Fiorani has been appointed commercial manager of the utilities under the management of C. D. Parker & Company, Inc., Boston, with headquarters at the offices of the Union Light & Power Company, Franklin, Mass. Mr. Fiorani has been with the Union company for the past nine years.

W. W. Arnett, Jr., has resigned his position of commercial engineer in the power department of the Monongahela-West Penn Public Service Company, Fairmont, W. Va., to join Brooke, Stokes & Company, bankers of Philadelphia. C. R. Huffman, local sales representative of the General Electric Company, has succeeded Mr. Arnett.

Franklin N. Fernald has been elected vice-president and treasurer of the Central Connecticut Power & Light Company, East Hampton, Conn., succeeding L. P. Perry, who recently resigned to become general commercial manager of the United Hudson Electric Corporation, Poughkeepsie, N. Y. Mr. Fernald was formerly a member of the power sales engineering staff of the Narragansett Electric Lighting Company, Providence, R. I.

Herbert G. MacMurchy, who formerly was in the engineering department of the Aluminum Company of America at Pittsburgh, has resigned and is now connected with the Phoenix Utility Company of Allentown, Pa. Mr. MacMurchy is electrical construction engineer in charge of the installation of electrical equipment in the new Fourth Street steam-electric station for the Memphis (Tenn.) Power & Light Company.

E. E. Carpenter, a member of the firm of Baker & Carpenter, engineers, of San Francisco, has been appointed chief electrical engineer for the British Columbia Electric Railway Company, Vancouver, B. C. Mr. Carpenter followed railway engineering for about seven years after his graduation from Stanford University in 1898. Subsequently he was chief construction engineer for Sanderson & Porter, on the Stanislaus River power development of the Sierra & San Francisco Power Company and chief engineer for the same firm in charge of design and construction of power development installation for the British Columbia Electric Railway Company at Jordan River, on Vancouver Island. As a member of the firm of Baker & Carpenter he has engaged in general consulting and executive practice.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

Need of a Climate Rating for Cities

Standardization Greatly Affected by Atmospheric Conditions—An Important Factor in the Manufacture and the Purchase of Outdoor Equipment

By J. R. Kearney
Sales Manager W. N. Matthews Corporation, St. Louis

IT IS a very difficult thing to develop standardization on a national basis when it comes to the construction of equipment that is used out of doors and is affected by atmospheric conditions. Utility men, in co-operation with electrical manufacturers, have been at work on this problem for years and have made material progress. Much has been learned, for instance, about the resisting qualities and the endurance of pole-line hardware, outdoor switches and other equipment. A very large amount of money has been spent each year in this development. But I doubt if any ten men from different sections of the country will agree on 50 per cent of this standardization. Each man feels that his conditions are different and that he must have more or can do with less protection than the standard provides, and in many cases he is right.

In other words, the life and performance of materials in outdoor service is more than anything else dependent upon the conditions in the air in the cities where they are used. And these conditions vary with the location of the city in relation to altitude, to the sea, and in regard to the atmospheric conditions which are caused by the effects of different classes of industries. It is impossible, for instance, to obtain the same results from the same equipment in Boston, Cleveland, Pittsburgh, Chicago, Minneapolis, Kansas City, St. Louis, New Orleans, Dallas, Denver, Salt Lake, Butte, Seattle, Portland, San Francisco and Los Angeles. But I believe that it would be a comparatively easy matter to decide upon standards for both materials and methods if these different cities were zoned or classified on the basis of the atmospheric or climatic conditions that obtain.

Consider Cleveland, for example. Atmospheric conditions are severe, owing apparently to the presence of many foundries, brass works and other industries which pour smoke and gases into the air. Rust is as active as in salt air. Aluminum cannot be used, say, in fuses, whereas in Kansas City or Minneapolis there is no trouble. Dampness from the lake also probably contributes to this condition; but, on the other hand, Buffalo is far easier on wood and metals, because, I assume, Buffalo has fewer industries that affect the atmosphere.

J. R. Kearney

St. Louis would also be classified as severe. Aluminum can be used there fairly well, but galvanized-steel brackets will not stand up. There seems to be an acid in the air due to soft coal. New Orleans, Boston, Pittsburgh, Seattle and San Francisco would also be grouped in the same severe zone, because salt air or smoke or other conditions make them hard on outdoor equipment. In Pittsburgh there is an iron dust from the steel mills that settles on everything and makes a most severe condition. It causes a metallic coating to form on insulators, for instance, and makes necessary the use of oversize insulators. On 660-volt circuits common use is made of 3,300-volt material.

These cities are very hard on aluminum and galvanized steel, for they will last only a year under conditions where in many other cities they will stand up for twenty years. Brass cannot be used with any success at all, for it quickly becomes crystallized and brittle. In St. Louis there seems to be a very active electrolytic action. Wood also breaks down quickly.

Detroit, Memphis, Chicago, Columbus, Buffalo and Philadelphia would be classed as in an intermediate zone. Here brass suffers quickly by corrosion, but aluminum or galvanized steel will last, say, five years, and nothing like the difficulties that obtain in cities of the severe zone are experienced. Minneapolis, Denver, Salt Lake and Kansas City would be grouped in a mild zone, where aluminum is all right, and brass will stand up fairly well, and galvanized steel is good for ten years.

Based on the known record of the various materials used in outdoor equipment, practically every city in the country could be classified under one of three or more climatic zones, and standards could be developed to suit the several zone conditions and made very definite. The result would be that every utility company would know in just which zone it belonged and therefore just which class of materials it must buy to get good service and economy. Protection would come from a knowledge of zone conditions and men would buy to suit these conditions. It would save many lives, for many accidents come from the breakdown of some part that under the influence of a severe atmosphere some day turns what has always been a safe point into a point of danger. It would save much money in replacements and in labor. It would save many failures in service which are hurtful in public relations.

There are many people who are manufacturing equipment of this kind merely to sell and not for service. Under the plan proposed, whereby each buyer would know his zone and the standard demanded for it, a manufacturer of this type could not get a clearance for his goods that they did not measure up to. He could not sell in a zone where they did not qualify. It would save a large amount of waste and disappointment.

At present the manufacturer is free to urge his goods wherever there is a market. The location of Buffalo, Cleveland and Detroit along the lakes would seem to argue that what is good in one is good in all. Yet unseen chemical conditions in the air of Cleveland make it much harder on such equipment than the other two towns. If cities were rated, all this would be clear.

I think the manufacturers would welcome such a plan as they could then build their equipment to meet the different zone conditions. If this could be accomplished, the utilities in the different zones would pay the price for their materials in proportion to the mild or extreme zone condition which must be met. This would save many of the utilities a large amount of money and would not cause any more expense than at present in the more severe zones. If zoning was approved by the national standardization committees, the cities that would be placed in the severe zone would be willing to pay more money for their equipment than those situated in the milder zones.

I do not believe more than four zones would be required to cover the entire country, and possibly this could be well accomplished in three zones.

Guiding Exports by Past Performances

New Statistical Pictures Show the Changes in Demand by Foreign Countries for Seasons—How Manufacturers May Use Figures Advantageously

By S. H. Day
Electrical Equipment Division, Bureau of Foreign and Domestic Commerce

BEGINNING with the first of January of this year, we started in the electrical equipment division of the bureau a system of tables or accounts on which are being recorded monthly figures showing both the quantity and the value of electrical exports from the United States by countries of destination.

A separate table is being made up for each of the sixty-five classes of electrical materials which find their way into foreign markets. The figures are being combined cumulatively so that in addition to showing the changes from month to month the latest entries give the total for the year up practically to the current month. This gives us a picture, so to speak, of the actual extent of the electrical business being done by American exporters in any foreign country with respect to all classes of materials, or, taking it from another angle, we can study the situation from the standpoint of a particular class of appliances or apparatus in all the foreign markets of the world. Thus a manufacturer of one single line of electrical appliance will be interested in the export business being done in his product in all countries of the world, and he may also want to know something about the electrical import business generally in some country where he has exceptionally good representation with a view to expanding his export line, undertaking an advertising campaign or possibly studying the bearing of sales of other materials upon the demand for his own product.

The two groups, motor-driven household devices and domestic heating and cooking appliances, have followed a similar trend during the last seven months. The total shipments increased last fall until the peak was reached in November, followed by a steady decline extending through January of this year. There was a holiday demand for these lines in 1922, which can undoubtedly be counted on regularly in the future. I wonder how many manufacturers of vacuum cleaners, washing machines, electric hair driers, vibrators, etc., take special steps to bring their product to the attention of foreign consumers during the December buying period. This may suggest a number of ways in which product can be pushed to take advantage of the holiday seasonal trade for these appliances.

From the standpoint of particular foreign markets, American motor-driven household devices were in steady demand in eight different foreign countries during the last seven months, while shipments of domestic heating and cooking appliances in substantial numbers reached twenty-five foreign markets during each month of the same period. Less seasonal variation is shown in our exports of domestic heating and cooking appliances for the reason that both hemispheres are included in the wide distribution of markets. Thus the absence of demand for heating appliances below the equator during the period from September until March is balanced by the need for them at this time of the year in the northern half of the world.

In motor-driven household devices Canada is our best foreign market, with Great Britain a close second. The Netherlands came next in importance, followed by Japan, Australia and Switzerland. The Latin-American countries took small amounts only, Mexico being the best customer. Cuba and one or two others are receiving small but fairly regular shipments of this class each month. Some other countries were intermittent buyers of rather large quantities, France being one of these. The same kind of demand is also apparent in Norway and South Africa.

There is a much broader range of foreign markets for domestic heating and cooking appliances. The figures for the last seven months show the seasonal demand in the Northern Hemisphere for heating equipment and, of course, reflect conversely the lack of need in the countries below the equator at this time of the year. The export business went first to Canada and second to Great Britain, the same as with motor-driven devices.

Seasonal Demand for Fans

A study of the foreign markets for electric fans on the basis of actual exports during the fall and winter months must at once take into consideration the seasonal nature of the demand for this appliance. The figures, therefore, show primarily the market possibilities of the Southern Hemisphere, together with the tropical regions where electric fans are used extensively throughout the year.

British India, which is our leading foreign market for electric fans, received more than $500,000 worth during December and January, the shipments during December being the largest for any of the seven months under consideration. The

market for fans in India is capable of almost indefinite expansion, although the question of sales channels is a difficult one and probably cannot be solved until enough business men settle in India to provide facilities for handling all American lines. The bureau is contemplating more extensive trade-promotion work in India, and American manufacturers of electric fans should receive direct benefit from this.

The increasing use of electrical appliances is following the rise in standards of living that is taking place in almost all countries of the world. This is evident even in those nations which are struggling with the after-effects of the war as well as in the more backward countries of the Orient. In fact, the war-torn regions are turning to electrical appliances as a means of economizing human effort, and labor-saving devices are beginning to play an important part in restoring the normal productivity of all those foreign countries.

American products since the war have achieved a splendid reputation in foreign markets, especially for quality and service, and I believe that American manufacturers of electrical appliances have a great opportunity before them if they will establish and perfect their selling channels in the important markets of the world and prepare for the permanent demand for their product which is sure to come.

Business Conditions

A Survey of Important Developments in the Electrical Market Including Data on Production, the Sales Outlook, Credits, Exports, the Metals and Other Conditions Affecting Cost, Supply and Demand

BUSINESS in the present electrical market has the appearance of much steadiness, with little indication of change within the next two weeks. For this week there are no spectacular price decreases or advances to report with the exception of a slight raise in motor prices in the Pacific Coast and Chicago territories and a 10 per cent marking up of porcelain in the East.

New England Farm-Lighting Business Is on Gain

SALES of farm-lighting sets show healthy gains for May in the New England district, a representative distributor stating that this was the best month this year in that territory. Road conditions are now so close to normal that sales activities are no longer impeded by poor highways.

Deliveries are being made regularly out of Boston stocks, and prices are reported firm, with some tendency toward stiffening on account of increased material costs. Manufacturers of this class of equipment are working close to the full rating of their present plants. Expressed in number of units going into the field, probably at least one-third more are being shipped than was the case a year ago, and some distributors are probably exceeding this figure.

Slight Improvement Shown in Eastern Purchases

A SLIGHT improvement in orders placed with jobbers was noted last week in the Eastern territory. There is an immense volume of electrical business under way, notwithstanding a continuance of the tendency toward a quieter market. Stocks are meeting current demands readily and prices are firm. A 10 per cent increase in porcelain was announced last week. Jobbers are gradually rounding out deficiencies in their stocks, although conservatism in buying is evident in long-time views. Railroad embargoes which have hampered Eastern electrical shipments are virtually lifted at the present time. General business is active, although labor troubles in the shoe industry and heavy pressure upon textile mills, due to higher wage scales, are causing some curtailment of production. Motor business reflects very keen competition at present, with some factory capacity idle and uneasiness as to prices. Appliances are moving fairly well, washers and cleaners being active.

Street-Lighting Business Showing Healthy Growth

POPULAR demand for improved street lighting in many parts of the country is being reflected in a gratifying growth of business taken by representative manufacturers. This growth since the war has not been spectacular, although a reported appropriation of eight million dollars for municipal improvements, including street lighting at St. Louis, seems likely to cause a sudden jump in the equipment production curve in the near future.

Factory stocks are rather low at present, and the market for this class of apparatus is sufficiently active to absorb most of the production as it leaves the manufacturing departments. Prices are on the whole steady, and the supply of labor is not subject to the severe fluctuations experienced in many other lines.

Raw-material deliveries are somewhat slow and require close attention from the manufacturing angle. Full-time operation is meeting current requirements nicely, and the demand for the larger sizes of arc-lighting equipment keeps pace with the growth of series incandescent equipment sales, bearing in mind the adaptability of each to particular fields of service. Orders of representative street-lighting equipment makers appear to be well distributed throughout the country, the expiration of municipal contracts with central stations often furnishing occasions for the introduction of new and improved equipment.

Motor Sales in San Francisco Are Excellent

BUILDING conditions are excellent save for an occasional shortage of building material. Permits totaled $4,928,986 for May as against $4,377,066 for May last year. Export business is at a low ebb with signs of even further depression. However, this condition is general and beyond the power of the community to correct. Crop indications are excellent. Plenty of new rolling stock has been ordered to prevent last year's losses from delayed shipments. Dealers' business is decidedly better. Refillable-fuse sales in smaller sizes seem to have been affected by sales of non-refillable, non-indicating types. Standardization of 40-deg. motors has necessitated careful handling of stock, for sales are excellent and apparently well distributed.

Chicago Jobbers and Dealers Report Steady Business

CHICAGO electrical dealers and jobbers report a steady but quiet week of trade. Price advances announced this week included one from a manufacturer who increased motors of certain types 10 per cent. These motors were not included in the increase several weeks ago. The contracting game has slowed up, which accounts for the temporary lull in business. Building permits issued this week were 287, as against 294 for the same week last year. For May, 1923, the building permits totaled $33,721,330, as against $27,029,650 for May, 1922. Wage increases for fourteen open-shop building trades operating under the Landis award went into effect June 1 with increases ranging from 10 to 20 cents.

Sales of flatirons, vacuum cleaners and washing machines have been normal. Although numerous advertising sales campaigns are being started, no important increases in the sales of these commodities have been felt.

According to the Federal Reserve Bank of Chicago in its June report, labor shortage is reported by a number of firms. "Prompt deliveries of steel and steel products were hard to obtain," the report says, "with a few firms including lumber in the products not readily available. The steady increase in prices of raw materials, together with increased wages, has caused some firms to increase the price of their

goods. The demand for agricultural machinery and equipment was reported fairly good, but manufacturers express concern as to the future owing to increased prices."

Conditions in Philadelphia Market Satisfactory

ACCORDING to reports from Philadelphia, dealers in electrical supplies are continuing to enjoy good business, except in the case of radio equipment, in the sales of which there has been a seasonal decline. The majority of orders are for immediate delivery, and in practically all cases it is possible to meet the demand.

Stocks generally are moderate and are decreasing. Some jobbers are having difficulty in obtaining delivery on equipment bought in New England, because of the freight situation there, and others report slow delivery on their orders for copper wire and conduit.

Prices are rising on many materials, and lists are higher than they were last month and a year ago. Quotations on specialties, however, have changed but little recently. Electrical contractors are busy on work placed some time ago, but they report that, while they are receiving numerous inquiries, few contracts are being closed at this time.

Collections in practically all cases are fair, and although they are little changed from last month, in some instances they are slower than they were last year.

Electrical Goods Took Largest Part of 1922 Copper

COPPER consumed in the United States during 1922 is estimated by the American Bureau of Metal Statistics at 1,091,397,000 lb., compared with 904,753,000 lb. in 1921, 1,346,090,000 lb. in 1920 and 1,224,710,000 lb. in 1919. This consumption was divided as follows, the figures indicating the thousands of pounds:

	1922	1921
Electrical goods*	269,000	260,000
Telephone and telegraph	120,000	108,000
Light and power lines†	97,500	66,000
Wire and rods	91,000	77,000
Automobiles‡	144,000	92,000
Auto brake lining	1,600	1,400
Buildings§	73,900	44,300
Locomotives	5,030	5,890
Railway cars	7,470	5,480
Air brakes	5,600	3,350
Ships, commercial§	6,180	38,000
Ships, naval§	170	9,900
Bearings and bushings	42,000	28,000
Valve and pipe fittings	20,000	11,500
Ammunition	14,500	16,500
Lubricators	5,500	1,600
Condensers	4,800	4,000
Fire-fighting apparatus	3,100	2,300
Agricultural machinery	500	720
Cash registers	1,000	400
Copper-bearing steel	1,900	1,700
Coinage	475	2,930
Other uses¶	95,000	72,000
Manufactures for export	81,172	51,783
Total	1,091,397	904,753

*Generators, motors, switchboards, lamps, etc., exclusive of telephone and telegraph purposes.

†Outside wiring only; does not include trolley lines.

‡Does not include electrical manufactures.

§Does not include electrical generators, motors, etc.

¶Includes rods, wire, sheet, tubes and all similar fabrications of copper for export.

General Business Conditions Are Called "Spotted"

BUSINESS conditions in manufacturing and agricultural lines are characterized as "spotted" by the mercantile agencies. The situation is decidedly irregular, with the general trend, as regards new buying, in the direction of increased quiet, according to *Bradstreet's*.

In regard to the jobbing and retail trades "the increased quiet seems most marked in the eastern half of the cotton belt and in some West Central States," says the agency, "and is due mainly to weather conditions. In the eastern half of the South almost continuous rains were complained of as preventing crop work, retarding retail buying and rendering an already late season later still. Industry, owing to activity on old orders and the pushing to completion of building already planned, is relatively most active of all the great trade branches, but growing quiet in cotton goods manufacturing is noted East and South, and Eastern shoe manufacturing is also among the lines noting a seasonal shading off of industry. Mail-order trade continues active, an indication of farmers' ability to buy."

Range Business Good in West and South

MANUFACTURERS of electric ranges report a decided increase in their total volume of business this spring as compared with last year, although trade in the East is somewhat spotty. One representative house is selling at least 33 per cent more ranges than a year ago, and the outlook for the summer is better than for some time. In some circles complaint is heard as to the lack of interest of central stations, especially in the East, in the electric range as a load builder, and one manufacturer said to the ELECTRICAL WORLD that the lack of experienced range users and salesmen in utility organizations is severely handicapping this development.

This producer feels that in the older sections of the country there is too much of a disposition to remain satisfied with the normal growth of central-station business; that the revenue possibilities of electric cooking are little realized in these quarters, and that too few utility men appreciate the fact that recent designs of ranges are being marketed at prices which compare very favorably with the retail prices of first-class gas ranges—a condition which has not obtained formerly and which has been long in coming, but which bids fair to remain permanent.

Orders from the West and South reflect the brighter spots on the sales manager's map in the range factory. No spectacular shipments are going forward at the moment, but buying is steadily increasing and it is difficult at this time to build up much in the way of factory stocks.

A disposition on the part of retailers to purchase ranges in lots of half a dozen rather than in single units can be seen here and there. Demonstration work is very active, and excellent results have come from recent fairs and exhibitions in which electric cooking has been thoroughly exploited.

Aggressive development of the heavier appliance business has not been generally characteristic of municipal lighting departments, but Reading, Mass., sold fifty ranges in eight weeks after a two-day electrical show. Factory conditions reflect good supplies of raw material and labor, broadly speaking. Manufacturers report they are ready to render a greatly increased service to the utility industry with this product, and current opinion has it that if the distributor and retailer will quicken the merchandising pace, a fine year's business will be recorded.

English Electrical Exports Fell £21,801 in April

THE following are official values of electrical machinery, apparatus and material exported from England (a) during April, 1923, and (b) the aggregate figures from Jan. 1 to April 30, with the increase or decrease compared with the corresponding periods of 1922:

The total exports of electrical machinery, apparatus and material, other than insulated wire, were £1,022,779 during April, a decrease of £21,801 from April of 1922.

Electrical machinery, (*a*) £311,699 (decrease £138,790), (*b*) £1,327,415 (decrease £359,468); including railway and tramway motors, (*a*) £19,006 (increase £13,908), (*b*) £85,660 (increase £26,952); other generators and motors, (*a*) £171,000 (decrease £31,263), (*b*) £697,949 (decrease £303,504); and other electrical machinery, (*a*) £121,693 (decrease £121,435), (*b*) £543,806 (decrease £282,916); telegraph and telephone cables, submarine, (*a*) £37,128 (increase £14,108), (*b*) £186,804 (increase £81,533); other than submarine, (*a*) £100,606 (increase £38,793), (*b*)

Comparative Prices of Station Supplies

	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars, per lb.	$0.034	$0.0326	$0.0236
Cold finished shafting, per lb.	0.042	0.0406	0.032
Brass rods, per lb.	0.1850	0.1913	0.1466
Solder (half and half), per lb.	0.2862	0.2987	0.21
Cotton waste, per lb.	0.1231	0.1231	0.104
Washers, cast iron (¼-in.), per 100 lb.	4.66	4.66	4.00
Emery, disks, cloth, No. 1, 6-in. diameter, per 100	2.96	2.96	3.11
Machine oil, per gal.	0.349	0.349	0.40
Belting, leather, medium, off list	42½%	42½%	48½%
Machine bolts, up to 1-in. x 30-in., off list	44½%	44½%	62½%

£320,991 (increase £113,442); telegraph and telephone apparatus, (*a*) £175,178 (increase £8,269), (*b*) £637,391 (decrease £70,587); other electrical wires and cables, rubber insulated, (*a*) £78,935 (increase £29,004), (*b*) £375,461 (increase £179,957); with other insulations, (*a*) £81,557 (decrease £2,010), (*b*) £350,955 (decrease £70,071); carbons, (*a*) £1,151 (decrease £1,699), (b) £18,493 (increase £3,035); glow lamps, (*a*) £29,735 (decrease £9,443), (*b*) £105,768 (decrease £30,352); arc lamps and searchlights, (*a*) £576 (increase £167), (*b*) £2,265 (decrease £989); parts of arc lamps and searchlights (other than carbons), (*a*) £49 (decrease £497), (*b*) £295 (decrease £1,643); batteries, (*a*) £37,670 (decrease £4,320), (*b*) £181,127 (increase £33,224); electrical instruments (commercial and scientific) and electricity meters, (*a*) £29,585 (increase £1,038), (*b*) £107,902 (decrease £26,586); switchboards, (*a*) £18,504 (increase £5,319), (*b*) £45,484 (decrease £93,566); other electrical goods and apparatus, (*a*) £120,406 (increase £38,260), (*b*) £444,457 (increase £25,462).

The Metal Market

CONDITIONS continue extremely quiet in the non-ferrous metal market, and prices generally are stationary or decreasing. Consumption continues as great as ever, with practically all metal users operating their plants at as near capacity as labor conditions will permit, but the unfilled orders on their books are not so great as they were a few months ago.

This is due not so much to an anticipated slackening in the demand for the ultimate product as to a feeling that commodity prices generally are likely to exhibit a downward trend and that it will be wise not to book orders for raw material farther ahead than necessary to insure deliveries in ample time for requirements.

Copper has been practically unsalable all week, and the larger producers almost without exception have done little or no business. Offers have been made at constantly decreasing prices day by day without tempting consumers in the least.

NEW YORK METAL MARKET PRICES

	May 29, 1923 Cents per Pound	June 7, 1923 Cents per Pound
Copper, Electrolytic	15.25	15.00
Lead, Am.S.& R. price	7.25	7.25
Antimony	8.00	8.00
Nickel, ingot	28.00 to 31.00	27.00 to 30.00
Zinc, spot	6.60	6.35
Tin, Straits	43.00	42.20
Aluminum, 98 to 99 per cent	26.00	26.00

Copper exports from United States in March totaled 67,122,745 lb. The principal items were: Refined ingots, bars, etc., 57,185,756 lb.; plates and sheets, 724,648 lb.; rods, 5,639,241 lb.; bare wire, 521,337 lb.; insulated wire and cable, 1,839,215 lb.; other manufactures, including pipes and tubes, 890,801 lb.

Activities of the Trade

Devoted to News of the Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

General Electric May Sales Were Heaviest in Company's History

May sales by the General Electric Company broke all previous records. Its bookings for the first quarter of this year are at the annual rate of about $320,000,000, while billings are averaging about $25,000,000 monthly. At a basis of $300,000,000 for the year, sales billed would exceed the total of last year by nearly $100,000,000. Bookings in that period totaled $242,739,527.

Unfilled orders amount to about $100,000,000, as compared with $76,220,000 at the end of last year. This total shows the tremendous volume of business which the company was offered in the first five months.

The company's cash position shows little change from Dec. 31, when its cash and government securities amounted to $85,341,539. Inventories have shown a disposition to increase owing to the larger orders. These footed up $75,334,562 on Dec. 31.

Earnings during this year are expected to run ahead of the preceding twelve months, when $14.86 a share was shown on the $175,624,746 outstanding common stock.

Link-Belt Company Changes

The Link-Belt Company of Chicago and Philadelphia announces that L. M. Dalton has succeeded E. J. Burnell as manager of the Boston branch office. Mr. Burnell resigned his post to enter business.

The Cleveland office of the Link-Belt Company has moved from room 429 to room 329, and the building in which it has so long found quarters has again changed hands and name. In the future the address of the Link-Belt Cleveland office will be 329 Rockefeller Building.

Steiner Electric Changes Location

Upon the consolidation with the Faden Electric Company on May 1, the Steiner Electric Company moved from 115 North Wells Street to 210 South Desplaines Street, Chicago. Upon this consolidation the company was incorporated for $100,000, since the former organization had been a partnership. The new officers are: Harold W. Steiner, president; Alex Faden, vice-president; George F. Steiner, sales manager and secretary, and M. Loehr, assistant secretary.

George F. Steiner says this new location affords the company double the floor space it had previously, and that upon the acquisition of the Faden company's stock electrical fixtures will be handled. For this he has been arranging a display room comprising one-eighth of the entire floor space of the company. A new arrangement of stock layout has been made to facilitate the disposal of electrical goods for city trade.

Wagner Motor and Control Apparatus Prices Increased

The Wagner Electric Corporation, St. Louis, on May 21 increased its prices of motors and control apparatus as follows:

	Increase, Per Cent
All single-phase motors larger than 3 hp.	10
All "Bw" type motors	5
Twenty-five-cycle motors, types "EP," "RP," "BM" and "BR"	10
Slip-ring control apparatus	10

All dealers and agents were notified that these prices were to be effective immediately.

Westinghouse Acquiries Savage Arms Plant at Sharon

Announcement is made of the recent acquisition of the plant of the Savage Arms Corporation at Sharon, Pa., by the Westinghouse Electric & Manufacturing Company. A large force of workmen is now engaged in remodeling and equipping the plant for the manufacture of transformers. It is expected that the plant will begin operation next fall.

The transformer division of the East Pittsburgh works of the Westinghouse company will be transferred to Sharon, according to officials of the Westinghouse company, and three thousand persons, including a large number of girls and women, will be employed in the new Westinghouse plant when it begins operation. The acquisition of the Sharon plant was necessitated by the increasing business in transformers and the need for extending the facilities of production and manufacture of this type of electrical apparatus.

C. H. Champlain, who has been assistant works manager at the East Pittsburgh works, has been appointed works manager of the Sharon plant, and M. L. Fawcett, general foreman of the transformer department, has been made superintendent of the new works. Both officials are now engaged in directing the work of fitting the new plant for the manufacture of transformers.

All types of transformers, from the very smallest to some of the largest in the world, eventually will be made at the Sharon plant, and this will involve the transportation and installation of a large amount of machinery and testing equipment. Among the operations to be performed in the construction and

assembly of transformers are the drawing and forming of steel for tanks, the winding of coils, stamping of metal for cores, the manufacture of insulating bushings and the testing of the complete units.

Black & Decker Make Second Price Reduction This Year

The Black & Decker Manufacturing Company, Towson Heights, Baltimore, announces a further reduction in prices, effective June 1, as follows:

	Former Price	Present Price
½-in. portable electric drill	$82	$75
Heavy-duty ½-in. electric drill	100	90
½-in. portable electric drill	105	95
⅜-in. portable electric drill	105	95
½-in. portable electric drill	125	110

This makes the second reduction in prices that this concern has made this year. Its reduction on Jan. 13 was as follows:

	Former Price	Present Price
½-in. portable electric drill	$49	$28
Special ½-in. electric drill	106	88
Bench drill stand	45	38
Post drill stand	50	44
6-in. electric bench grinder	70	48

Makers of "Chromalox" Win Heating-Element Equipment Suit

The United States District Court for the Northern District of Ohio, Judge D. C. Westenhaver presiding, on May 11 rendered a decision in the patent controversy between Edwin L. Wiegand of Pittsburgh and the Dover Manufacturing Company, Dover, Ohio. In this decision the court upheld thirteen of the fourteen claims of the Wiegand patent, covering equipment used in the manufacture of embedded heating elements. The court also refused to hold invalid the Wiegand article and process patents 1,154,953 and 1,136,076 respectively.

The court held that the Dover Manufacturing Company has a limited shop right to manufacture and sell electric sadirons containing certain of Wiegand's inventions made during his employment by the Dover Manufacturing Company from 1911 to 1914. This, however, does not permit the Dover Manufacturing Company to use the Wiegand patents on the improved processes and equipment subsequently developed and used by the Edwin L. Wiegand Company in the manufacture of its line of "Chromolax" heating units, of which it is the only authorized source.

George Drake Smith Resigns from Steinmetz Vehicle

George Drake Smith has announced his resignation as sales manager of the Steinmetz Electric Vehicle Company. Mr. Smith has organized an investment business in New York City and will specialize in public utility securities. He has recently been elected a director of the American Drawn Steel Company, Erie, Pa.

Uehling Instrument Appointments

The Uehling Instrument Company, Paterson, N. J., manufacturer of Co_2 recorders and draft and vacuum gages, has just made two agency appointments, namely the Amsler-Morton Company, Fulton Building, Pittsburgh, for western Pennsylvania, and John A. MacDowell, 2039 Railway Exchange Building, St. Louis, for eastern Missouri and southern Illinois.

H. R. N. Johnson, who formerly represented the Uehling Instrument Company in Minnesota and the Dakotas, has joined the W. P. Nevins Company, 120 South Ninth Street, Minneapolis, Minn., which company is now the official Uehling representative in the territory mentioned.

W. N. Matthews Reorganization Is Effected Under Missouri Laws

The W. N. Matthews Corporation, St. Louis, manufacturer of electrical specialties, has just been organized under the laws of Missouri to take over the business of W. N. Matthews & Brother, Inc., a New Mexico corporation. The capital stock of the Missouri corporation will consist of 5,000 shares of $100 par value 7 per cent cumulative preferred stock and 100,000 shares of $1 par value common stock. The business of W. N. Matthews & Brother, Inc., will be taken over in its entirety by the W. N. Matthews Corporation and the old company dissolved.

The officers of the new company are: W. N. Matthews, president; Claude L. Matthews, secretary and treasurer, and C. C. Fredericks, vice-president and general manager. James R. Kearney will be manager of sales for the electrical division, and Louis P. Murray manager of sales for the mechanical painting division.

W. N. Matthews & Brother, Inc., was established in 1899 by W. N. Matthews, who prior to that time was in the electrical supply jobbing business and was one of the organizers of the Electrical Supply Jobbers' Association. Claude L. Matthews became the junior partner in 1901, after spending a year and a half in the employ of the Packard Electric Company, Warren, Ohio. James R. Kearney joined the organization in 1905 as a salesman, after resigning his position as superintendent of construction of the Topeka Edison Company.

Mr. Kearney of the electrical division has a sales organization of fifteen representatives reporting to him. These men are: W. J. McIlvane, 30 Church Street, New York City; George G. Young, Bourse Building, Philadelphia; H. Van Rosen, 294 Washington Street, Boston; H. B. Parke and J. A. Jaques, 305 Seventh Avenue, Pittsburgh; H. C. Biglin, Atlanta; D. C. Griffiths and D. B. Graze, Marshall Building, Cleveland; J. T. Pearson, 1525 Dime Savings Bank Building, Detroit; H. L. Brueck, 29 South Desplaines Street, Chicago; J. E. Sumpter, 222 Security Building, Minneapolis; W. M. Watters, 1319 Main Street, Kansas City, Mo.; O. H. Davidson, 1633 Tremont Street, Denver; R. S. Wakefield, 324 Interurban Building, Dallas; D. Schneider, Kenyon Building, Louisville, and Ben C. Holst, Furniture Exchange Building, San Francisco.

National Lamp of Cleveland Has Arranged to Close Warren Plant

The National Lamp Works of the General Electric Company, Cleveland, have arranged for the closing of their plant at Warren, Ohio, and operations will be transferred to the main works at Cleveland. It is proposed to remove equipment also to this location. The change is expected to be made on July 16. The Warren plant has been giving employment to about four hundred operatives. It was started twelve years ago.

The company recently shut down its plant at Shelby, Ohio, previously operated as the Shelby Lamp Division, after twenty-five years' continuous service. The Youngstown and Niles (Ohio) plants, it is said, will be continued as heretofore, the latter works being devoted to bulb production.

The Bakelite Corporation, 8 West Fortieth Street, New York City, manufacturer of electrical insulation products, has acquired the former plant of the Lake Erie Foundry Company, Painesville, Ohio, for new branch works.

The Gifford-Wood Company, conveying machinery, Hudson, N. Y., announces the removal of its Buffalo office to Pittsburgh, People's Bank Building.

The Simplex Wire & Cable Company. 201 Devonshire Street, Boston, has awarded a contract for a one-story, 51-ft. x 36-ft. factory on Pacific Street, Cambridge, Mass.

The Fulton Container Company, Nitro, W. Va., recently organized by Charleston (W. Va.) interests, will build a plant for the manufacture of electric battery containers, under a special process, and kindred equipment. It will cost $40,000. David A. Jayne is president of the company.

The American Insulator Corporation, New Freedom, Pa., is installing machinery and other equipment in a manufacturing plant recently leased from the Danbury Industrial Corporation, Danbury, Conn.

The Western Electric Company, 195 Broadway, New York City, will soon take bids on a general contract for the initial unit of its new cable and instrument plant on property recently acquired on the Newark Meadows, Kearney, N. J., to cost approximately $500,000.

The Electric Apparatus Company, Parkesburg, Chester County, Pa., has been organized to manufacture electrical apparatus. Plans for the future are not definitely formed. Horace A. Beale, Jr., is president, H. B. Wiese secretary, and E. H. Brodhead vice-president and general manager.

Foreign Trade Notes

NEW ELECTRIC PLANT IN SOUTH AFRICA.—The construction of a large power plant near the Witbank station is contemplated by the Victoria Falls & Transvaal Power Company, to cost about £1,000,000. The proposed station will be equipped with three electric generating units of 20,000 hp. each.

ELECTRIC PUMPS PROPOSED FOR GALICIAN OIL FIELDS. — Developments are in progress in the Galician oil fields looking to the substitution of electricity for steam for operating pumps. A power station has already been erected by the Premier Oil Company (French) at Borys-law with this end in view. If the present experiments show economy of operation, it is expected that the change will become general.

PROPOSED HYDRO-ELECTRIC DEVELOPMENT IN LATVIA.—The construction of a hydro-electric power plant on the Dunn River at Kokenhusen for the distribution of electricity in Lettonia is under consideration by the government.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

Purchase is desired in London, England (No. 6,649), of head sets, radio equipment, etc.

Purchase is desired in Nancy, France (No. 6,658), of power-plant specialties and electrical maintenance supplies.

Purchase or agency is desired in Havre, France (No. 6,600), of enameled wire.

An agency is desired in Bayamon, Porto Rico (No. 6,634), of wire sockets, etc.

Purchase is desired in Bergen, Norway (No. 6,654), of pyrometers for ovens for malleable works.

Agency and purchase is desired in Santos, Brazil (No. 6,642) for electric washing machines.

TRANSFORMERS FOR MELBOURNE, AUSTRALIA.—Tenders will be received by the Victorian Electricity Commission, Melbourne, Australia, until Aug. 25 for thirty-one 22,000-volt transformers ranging from 15 kva. to 750 kva.

ELECTRIC EQUIPMENT FOR ALLAHABAD, INDIA.—Tenders will be received by the Public Health Department, Allahabad, India, until July 3 for equipment for pumping plant, consisting of oil engines, generators, motors and centrifugal pumps, at Fyzabad in connection with the water-supply scheme.

STORAGE BATTERIES, SWITCHES, ETC., FOR SYDNEY, AUSTRALIA.—Tenders will be received by the City Council, Sydney, Australia, until Nov. 19 for storage batteries, regulating switches, copper connections, charging boosters and switchgear, under Specification 736.

New Apparatus and Publications

ELECTRIC POLE AND LINE HARDWARE.—The St. Louis Malleable Casting Company, St. Louis, is distributing catalog No. 500, covering its pole and line hardware and electrical specialties for railway, lighting, power, telephone, telegraph and mining companies.

ELECTRIC LANTERN.—The Embury Manufacturing Company, Warsaw, N. Y., has placed on the market the "Embury Supreme" electric lantern. It carries three standard unit-cell batteries.

INDOOR EQUIPMENT. — Bulletin No. 222 issued by Schweitzer & Conrad, Inc., 4431 Ravenswood Avenue, Chicago, describes and list its indoor equipment, including high-voltage apparatus.

LIGHTING UNIT.—A new lighting unit, "Glassteel Diffuser," for commercial and industrial lighting has been developed by the Benjamin Electric Manufacturing Company, 847 West Jackson Boulevard, Chicago.

CIRCUIT BREAKERS.—Bulletin No. 313 issued by the Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, covers its automatic reclosing sectionalizing circuit breakers for direct-current distribution systems.

GASOLINE DRILL.—A gasoline impact drill of the air-hammer type is now manufactured by the Pennsylvania Gasoline Drill Company, Land Title Building, Philadelphia.

SELF-STARTERS. — Bulletin No. 6,106 issued by the Cutler-Hammer Manufacturing Company, Milwaukee, covers its time-limit acceleration type of direct-current self-starters, up to and including 200 hp.

ELECTRIC WASHING MACHINE.—The Apex Electrical Distributing Company, Cleveland, has placed on the market a new electric washing machine, known as the "M-2 Rotarex" washer.

CARBON BRUSHES. — The Universal Carbon Company, Dundee, Ill., is distributing a bulletin listing the prices of its carbon brushes. It also contains specifications as to the use of the various brush grades.

STEAMER AND THERAPEUTIC LAMP. —A therapeutic lamp which can be used in hairdressing establishments for facial and scalp treatment has been developed by the R-No-Mae Company, Inc., 57 Fifth Avenue, New York City.

PORTABLE ELECTRIC DRILL. — The Independent Pneumatic Tool Company, 600 West Jackson Boulevard, Chicago, has brought out a portable electric drill, "Thor," of ⅜-in. capacity.

VIOLET-RAY MACHINES.—The Parco Manufacturing Company, 211 High Avenue, Cleveland, has placed on the market a line of violet-ray machines, consisting of four models.

BELL-RINGING TRANSFORMER.—The Thordarson Electric Manufacturing Company, 500 West Huron Street, Chicago, has placed on the market a bell-ringing transformer with a steel case.

INSULATING COMPOUND.—An insulating compound especially adapted for radio parts has been developed by the Marlanite Company, Barberton, Ohio.

ELEVATOR CONTROLLERS.—The Cutler-Hammer Manufacturing Company, Milwaukee, has issued bulletins Nos. 9,843 and 9,872, covering its elevator controllers for two-speed alternating-current motors, the former for squirrel-cage-type motors, and the latter for slip-ring-type motors.

PUSH-BUTTON.—A line of push-buttons in which all parts are made of metal except the terminal piece and button has been brought out by the Danbury Electric Manufacturing Company, Danbury, Conn.

MOTOR-GENERATOR SET.—The Commercial Electrical Supply Company, St. Louis, has placed on the market a motor-generator set for operating bells, horns and mine signals and for charging storage batteries.

SIGN RECEPTACLE.—The Gordon Electric Manufacturing Company, Waterville, Conn., has placed on the market a sign receptacle for ceiling holder work.

THERMAL RELAY. — The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, is distributing bulletin No. 402, describing its type "TR" thermal relay for control circuits not exceeding 6 amp. at 125 volts or 3 amp. at 250 volts. The company has also issued instruction sheet No. 36, giving instructions and part list for the type "J" reverse-current relays.

BOX-TOE STEAMER.—An electric box-toe steamer for treating leather in shoe factories has been placed on the market by the Watlow Electric Manufacturing Company, 1409 Pine Street, St. Louis.

PLATE HEATER.—The Even Heat Electric Company, 2429 Canton Avenue, Detroit, has added a single-plate heater for either 600 watts or 1,000 watts to its line of electrical appliances.

New Incorporations

THE MISSISSIPPI POWER & LIGHT COMPANY, Calvert Building, Baltimore, Md., has been incorporated by George S. Newcomer, Douglas H. Rose and James Cary, 3d.

THE ARKANSAS-MISSOURI POWER COMPANY, St. Louis, Mo., has been incorporated with a capital stock of $350,000 by J. M. Moore, E. J. Badman and others.

THE INLAND POWER & LIGHT COMPANY, Portland, Ore., has been incorporated with a capital stock of $100,000 by Henry S. Gray, C. Larison and D. A. Evkman.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

PRESQUE ISLE, ME.—Plans, it is understood, are under consideration to increase the output of the electric plant of the Gould Electric Company.

GORHAM, N. H.—Work will soon begin on the foundations for the proposed two-unit hydro-electric plant to be built on the Androscoggin River by the Twin State Gas & Electric Company, to cost about $275,000.

BOSTON, MASS.—The Boston Insulated Wire & Cable Company plans to built an addition to its power house.

CAMBRIDGE, MASS.—The Cambridge Electric Light Company has issued $468,000 in capital stock, the proceeds to be used for extensions and improvements.

NEW BEDFORD, MASS.—The New Bedford Gas & Edison Light Company has secured permission to issue $1,145,000 in bonds, part of the proceeds to be used for extensions and improvements.

WORCESTER, MASS.—The New England Power Company has issued $1,800,000 in bonds, part of the proceeds to be used for its proposed hydro-electric power project on the Deerfield River.

NEW BRITAIN, CONN.—The Board of Public Works contemplates the purchase of material for the underground conduit system on Broad Street, consisting of 25,000 ft. of 3½-in. single-tile duct, 25,000 ft. of 4-in. and 15,000 ft. 3½-in. fiber duct, fifty manhole fromes and 1,600 barrels of cement. The cost of the material is estimated at $25,000.

NEW HAVEN, CONN.—A permit has been issued to the Connecticut Company for an addition to its power house on Grand Avenue, to cost about $20,000.

Middle Atlantic States

BATAVIA, N. Y.—The Western New York Utilities Company has taken out a new charter with capital stock of $950,000, allowing it to consolidate the company of the same name with the Genesee Light & Power Company. Extensions will be made in present power plants and systems.

FORT TOTTEN, N. Y.—Bids will be received by the Quartermaster, Torpedo Depot, until June 20, for 10 miles of submarine cable, one-conductor rubber-insulated and armored. (Post Artillery Specification 48-3.)

WESTVILLE, N. J.—Bids will be received by the Borough Council until June 20 for construction of a sanitary sewerage system, including an electrically operated sewage-pumping station.

CHESTER, PA.—A power house and machine shop will be erected in connection with the proposed brick-manufacturing plant to be erected at Bethel Road and the Baltimore & Ohio Railroad Company by a company now being organized by Samuel Addis, an official of the Chester Lumber & Coal Company. The cost of the plant is estimated at about $100,000.

FREEMANSBURG, PA.—The Pennsylvania Power & Light Company plans to build substation near here, to cost about $250,000, to supply electricity at Bethlehem and vicinity. A steel-tower transmission line will also be built.

HONESDALE, PA. — The Consolidated Power, Heat & Light Company, it is reported, is planning extensions and improvements to its system. The property was recently taken over by N. M. Seabrease & Company, Land Title Building, Philadelphia.

KINGSTON, PA.—The Glen Alden Coal Company, West Pittston, plans to build pewer house, 85 ft. x 90 ft., at its local Pettebone Colliery.

MILLERSTOWN, PA.—The Millerstown Borough Electric Corporation has been granted a franchise to install an electric light and power system.

PHILADELPHIA, PA.—The La France Textile Company, 4423 Frankford Avenue, plans to erect a power house at its mill.

PHILADELPHIA, PA. — Bids will be called for at once by the local supply officer, Navy Department, for four induction motors. (Aero Req. 1234.)

TWIN ROCKS, PA.—The C. A. Hughes Coal Company, Altoona, contemplates the installation of electric power equipment at its local properties, recently acquired from the Quality Coal Company.

LONACONING, MD.—The Georges Creek Coal Mining Company contemplates the installation of electric power equipment, with additional mining machinery, at the former properties of the American Coal Company, recently acquired, to cost $200,000. L. F. Gerdetz is engineer.

WESTON, W. VA.—The Weston Electric Light, Power & Water Company contemplates extending its transmission lines to furnish service at Halesville and vicinity.

WHEELING, W. VA.—The West Virginia Match Company, recently organized, plans to erect a power house at its proposed local plant, to cost about $100,000.

NEWSOMS, VA. — Contract has been awarded by the Newsom Light Company to construct a distributing system in the town and a transmission line.

NORFOLK, VA.—Plans are under way for the installation of an ornamental lighting system on Plume Street, consisting of thirty-four standards, to cost about $7,000.

YORKTOWN, VA.—Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, D. C., until June 20, for power-plant equipment for the Yorktown naval station. (Specification 4826.)

WASHINGTON, D. C.—Bids will be received by the Department of Agriculture until June 12, for one transformer.

WASHINGTON, D. C.—Bids will be received by the Chief Signal Officer, United States Army, until June 15, for sixty dynamotor units (Proposal 14739-1 CP); also, until June 13, for 32,000 ft. submarine cable and cable reels (proposal 14623-1 CP).

North Central States

DETROIT, MICH.—The Detroit Edison Company has issued $8,000,000 in bonds and $9,000,000 in capital stock, part of the proceeds to be used for extensions to its system. A transmission line will be erected to connect with the system of the Great Lakes Power Company.

GRAND RAPIDS, MICH.—The La Mar Pipe & Tile Company contemplates the installation of a power house at its proposed plant at La Mar, near Grand Rapids. J. Kent Wilson is general manager.

LIMA, OHIO.—The Ohio Power Company has purchased a site in Bath Township, where it will erect a substation, to cost about $100,000.

ORIENT, OHIO.—Bids will be received by the Department of Public Welfare, Administration Building, Columbus, until June 16 for furnishing material for a tunnel, piping and electric conduit in tunnel at the Institution for Feeble-Minded at Orient.

TORONTO, OHIO. — Preliminary work has been started for the proposed electric power project of the Pennsylvania-Ohio Power & Light Company on the Ohio River, near Toronto, to cost about $6,000,000. James D. Andrew, engineer, representing Stevens & Wood, Inc., is in charge of the work.

ELIZABETHTOWN, KY.—The Kentucky Utilities Company, Louisville, plans to extend its transmission line from Elizabethtown to Camp Knox., to cost about $25,000. G. T. Bogart is engineer for the company.

PINEVILLE, KY.—The Kentucky Utilities Company has awarded a contract to the Foundation Company, New York, for foundations and superstructure for its proposed local generating plant, to cost about $250,000.

GOSHEN, IND.—The Interstate Public Service Company, which controls the Hawks Electric Company, plans to double the capacity of the generating plant, at a cost of about $200,000. Arrangements are being made by the company to erect a transmission line to the proposed hydro-electric plant to be built at Mottville, Mich.

INDIANAPOLIS, IND.—Electric power equipment will be installed in the proposed milling plant to be constructed by the Perins Mills, Inc., Emerson Avenue to cost about $250,000.

MOUNT VERNON, IND.—The Southern Indiana Gas & Electric Company has applied to the Public Service Commission for permission to purchase the property of the Mount Vernon Electric Light & Power Company.

PEORIA, ILL.—The Illinois Central Light & Power Company has awarded a contract to the Foundation Company, New York, for foundations and superstructure for a local generating plant, to cost about $600,000.

ROCKFORD, ILL.—Extensions are being made to the plant of the Rockford Electric Company, to cost about $700,000. The work will include an addition to power station, installation of a new boiler, a 3,000-kw. generator, 3,500-hp. engine, switchboard, etc.

ASHLAND, WIS.—Steps have been taken by the Lake Superior District Power Company to secure the right-of-way for the erection of its proposed high-tension transmission line from Ashland to Hurley, a distance of about 35 miles.

FOND DU LAC, WIS.—Preliminary plans are being prepared by R. E. Schmidt, Garden & Martin, engineers, 104 South Michigan Avenue, Chicago, for power house and equipment, to cost about $45,000, for the St. Agnes Hospital.

MADISON, WIS.—Plans are being prepared by the Chicago & Northwestern Railway for a power house and machine shop, to cost about $150,000. A. W. Bowers, 201 South Blair Street, is divisional agent.

MASON, WIS.—The Mason Light & Power Company is planning to change its distribution system from direct to alternating current. Improvements will also be made to the power house, dam, etc.

MENASHA, WIS.—The City Council is considering the installation of an ornamental lighting system for a distance of 3 miles along the state highway from Menasha to Appleton. It is proposed to have the cities of Menasha and Appleton and the town of Menasha co-operate in connection with the installation and upkeep of this system.

SHEBOYGAN, WIS.—Extensive improvements are being made to the local electric plant by the Eastern Wisconsin Electric Company, to cost about $180,000. The work will include an addition to power station, the installation of a new boiler and accessories. Orders, it is understood, have been placed for the equipment.

CAMERON CITY, MO.—The City Council is considering calling an election to vote on the proposal to issue $150,000 in bonds, of which the proceeds of $133,300 will be used for improvements to the electric light and water systems.

JOPLIN, MO.—A special election will be held on June 19 to vote on the proposal to issue $80,000 in bonds for improvements to the street-lighting system and the city fire department.

STOCKTON, MO. — G. B. Steward and associates are organizing a company to construct and operate a hydro-electric power plant on the Sac River, with transmission system for service in this district. Russell & Axon, 404 McDaniel Building, Springfield, Mo., are engineers.

MADISON, S. D.—Steps have been taken by the Kiwanis Club for the erection of a transmission line from the city to Lake Madison to supply electricity to the Chautauqua camping grounds.

ADAMS, NEB.—The proposal to erect a transmission line has been approved by the voters. The Town Council will enter into a contract with the Blue River Power Company, Seward, to furnish electricity to operate the municipal electric system.

OMAHA, NEB.—The Metropolitan Utilities District will build an addition to its power house at Florence, including the installation of additional equipment.

WINFIELD, KAS.—The installation of electrically operated pumping machinery in connection with extensions to the municipal waterworks is under consideration by the City Commission, and $112,000 in bonds have been voted.

Southern States

LENOIR, N. C.—The State Legislature has appropriated $300,000 for improvements to the Appalachian Training School, to include a larger power plant, a laundry, cold storage, building for physical educational work, etc.

SPARTANBURG, S. C.—The Arcadia Mills., Inc., plan to build a power house in connection with their proposed new textile mill, to cost about $200,000.

SUMTER, S. C.—The O. L. Williams Veneer Company contemplates the construction of a power house at its proposed local factory, to cost about $100,000.

BLOUNTSTOWN, FLA. — The Florida Orchard & Packing Company, Thomasville, Ga., plans to build a power house in connection with a new fertilizer manufacturing plant near Blountstown, to cost about $100,000.

GROVELAND, FLA. — The Groveland Light, Power & Ice Company has completed plans for the construction of a power plant to cost about $80,000.

ATHENS, TENN.—The Tennessee Electric Power Company, Chattanooga, has been granted a franchise to construct an electric power plant and distributing system in Athens.

CHATTANOOGA, TENN. — The City Water Company plans to install electrically driven pumping machinery, auxiliary apparatus and new automatic stokers at its plant at Citico, near Chattanooga.

KNOXVILLE, TENN.—Plans are being prepared for a new power house for the Tennessee School for the Deaf and Dumb, to cost about $55,000.

MEMPHIS, TENN.—Plans for extensions and improvements to the municipal waterworks, for which $1,500,000 in bonds have been voted, include electrically operated pumping machinery.

MONTEREY, TENN.—The Putnam Mining Company, Cookeville, Tenn., contemplates the installation of electric power equipment at its local properties.

BESSEMER, ALA. — Steps have been taken for the installation of an ornamental lighting system in the business district.

CHILDERSBURG, ALA.—The Childersburg Brick Company, recently formed, plans to build a power house at its proposed local plant, to cost about $100,000.

ELBA, ALA.—W. H. Cauley is planning to rebuild his power house and sawmill, recently destroyed by fire.

HATTIESBURG, MISS.—The Acme Oak Flooring Company contemplates the installation of a power house at its proposed local mill, to cost about $100,000. D. P. N. Hackney is head.

LITTLE ROCK, ARK.—The Arkansas Central Power Company has plans under way for the construction of an addition to its power plant, to cost about $75,000.

TILTON, ARK.—The T. J. Moss Tie Company, Security Building, St. Louis, contemplates the installation of a power house at its new lumber and sawmill at Wrape's Spur, near Tilton.

SHREVEPORT, LA. — Plans have been abandoned for the proposed municipal electric power plant.

McALESTER, OKLA.—The installation of electrically operated pumps in connection with extensions to the municipal waterworks is under consideration, and $375,000 in bonds have been voted.

COLORADO CITY, TEX.—The Tubbock Cotton Oil Company will install electric power equipment at its proposed new plant, to cost about $200,000.

DALLAS, TEX.—Plans have been approved for an ornamental lighting system on Knox and Travis Streets, for which bids will soon be asked.

SAN ANTONIO, TEX.—Tentative plans have been prepared by the San Antonio & Rio Grande Valley Traction Company for the construction of a hyro-electric plant on the San Miguel River, to cost about $300,000.

WILLS POINT, TEX.—Bonds to the amount of $25,000 have been voted for improvements to the electric light system. L. Gilmore is city secretary.

Pacific and Mountain States

SEATTLE, WASH.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until June 12, for two transformers (Schedule 880), and for one switchboard (Schedule 881), for the Puget Sound Navy Yard.

SEATTLE, WASH.—The City Council has authorized an issue of $2,500,000 in bonds for extensions and improvements to the City Lighting Department as follows: Line extensions in residence districts, $385,000; installation of new services, $727,000; placing wires underground in the business district, $200,000; replacing four small generators with one 12,500-kw. generator at the Cedar Falls plant, $400,000; building warehouse, $250,000; substation at Spokane Street, $318,000; sealing operations at Cedar River basin, $100,000. The Council also authorized the sale of $1,000,000 of the Skagit bonds to complete the first unit of the hydro-electric project and also voted an appropriation of $40,000 to purchase the site for the substation on Spokane Street and Fourth Avenue.

OREGON CITY, ORE.—Contract has been awarded by the Hawley Pulp & Paper Company for the construction of an additional power plant, to have a capacity of

1,200 hp. The cost of the building is estimated at $100,000.

PORTLAND, ORE.—Grant Smith & Company, Portland, have filed two applications with the state engineer covering two power sites on the Deschutes River, one in Sherman County and the other in Wasco County. At the Sherman County site it is proposed to develop 40,000 hp., and about 29,000 hp. will be developed at the Wasco County site. The cost of the two projects is estimated at $8,000,000.

ANTIOCH, CAL.—The Pacific Gas & Electric Company has authorized an appropriation of $227,350 for the construction of the South Tower and Herdlyn transmission lines in Contra Costa County.

LIVERMORE, CAL.—The Pacific Gas & Electric Company has authorized the construction of two new transmission lines in Livermore Valley.

LOOMIS, CAL.—The Pacific Gas & Electric Company, San Francisco, contemplates the installation of an electric distributing in Loomis, to cost about $25,000.

LOS ANGELES, CAL.—Ordinances have been passed providing for the installation of ornamental lighting systems on Canal and Cahuenga Avenues, for which bids will soon be called.

OILDALE, CAL.—Steps have been taken by the Oildale Improvement Club toward the formation of a lighting district.

SAN DIEGO, CAL.—The Consolidated Gas & Electric Company plans to issue $1,438,000 in bonds and $674,400 in capital stock, part of the proceeds to be used for extensions and improvements.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company is planning to erect a large substation, known as "J," in the heart of the financial district. It will eventually be equipped with eight 2,600-kw. rotary converters.

SAN JOSE, CAL.—Bids will soon be called for the construction of a power plant at the Santa Clara County Hospital, to cost about $90,000. Binder & Curtis, South First Street, are architects.

LOGAN, UTAH.—Bonds to the amount of $300,000 have been voted to rebuild the municipal electric light plant in Logan Canyon.

Canada

NELSON, B. C.—Surveys are being made for the proposed transmission line extension of the municipal electric system from Nine-Mile on the Ainsworth to the Florence Silver Mining Company. The cost is estimated at $25,000.

SMITHERS, B. C.—The Federal Mining & Smelting Company, 120 Broadway, New York, contemplates the installation of electric power equipment at its local properties.

VANCOUVER, B. C.—Preparations are being made to make surveys of the Squamish, Cheakamus, Pitt, Lillooet, Chehalis, Chilliwack and Bridge Rivers and the Harrison Lake district with a view of securing estimates of cost of establishing a municipal hydro-electric plant.

LARDER LAKE, ONT.—The Associated Canadian Goldfields Company, Ltd., according to *Commerce Reports*, contemplates the construction of a hydro-electric plant at Wendigo Falls. Plans for the initial installation provide for 2,500 hp.

SHEFFIELD, ONT.—The Hydro-Electric Power Commission is planning to erect a transmission line from Lynden to Sheffield.

TORONTO, ONT.—The Hydro-Electric Power Commission of Ontario has applied to the City Council for permission to erect a new steel-tower transmission line along the water front from Humber River to Strachan Avenue.

TORONTO, ONT.—The Provincial Government has appropriated $12,687,000 to cover work planned for the year by the Hydro-Electric Power Commission of Ontario as follows: Niagara System, for completing the Queenston plant and new transmission lines, $9,850,000; Muskoka system, additions to plants and new equipment, $360,000; Rideau system, maintenance and repairs, $20,000; Thunder Bay system, new units at Cameron Falls; Nipigon River, transmission lines, etc., $1,086,000; Central Ontario system, largely to cover new plant at Dam 8 on Trent River, $375,000; Nippissing system, storage works and auxiliary, $17,000; Essex system, transmission line, $50,000; investigation of second Queenston-Chippewa development, $50,000. F. A. Gabey is chief engineer.

MONTREAL, QUE.—The Southern Canada Power Company is planning the construction of an additional hydro-electric plant on the St. Francis River at Hemmings Falls, to develop 30,000 hp.

Electrical Patents

Announced by U. S. Patent Office

(Issued May 15, 1923)

1,455,462. ELECTRIC RESISTANCE; O. Weeber, Berlin, Germany. App. filed April 10, 1918. For wireless tubes.

1,455,467. STREET INDICATOR; W. A. Wilson and S. Wilson, Vancouver, B. C. App. filed July 15, 1921. For trolley cars.

1,455,476. HOLDING OR SUPPORTING MEANS FOR RADIUM APPLYING MEANS; W. H. Cameron, Pittsburgh, Pa. App. filed Feb. 21, 1922.

1,455,572. ELECTRICAL SYSTEM; C. S. Cook, Pittsburgh, Pa. App. filed Oct. 30, 1916. Automatic railway substation.

1,455,578. TROLLEY COLLECTOR; P. T. J. Estler, London, England. App. filed May 2, 1922. Two trolley poles, one mounted above the other, for trackless cars.

1,455,592. PORTABLE LAMP; W. F. Lent, New Haven, Conn. App. filed March 24, 1921.

1,455,618. MOTOR-CONTROL SYSTEM; H. D. James, Edgewood Park, Pa. App. filed March 13, 1920. Dynamic braking.

1,455,638. FIRELESS COOKER AND HEATER; M. J. McFarlane, New Orleans, La. App. filed March 8, 1921. Has electric element.

1,455,668. MOTOR-CONTROL SYSTEM; G. B. Scheer, Berkeley, Cal. App. filed June 22, 1922. Insures dynamic braking upon failure of power supply.

1,455,717. ENGINE-STARTING SYSTEM; J. K. Delano, New York, N. Y. App. filed May 11, 1918. Motor-generator for automobiles.

1,455,735. RHEOSTAT; F. A. Rojas, New York, N. Y. App. filed March 23, 1922. Compressible resistance type.

1,455,747. ELECTRIC PROCESS OF CONTINUOUSLY HEATING METAL; A. E. Greene, Seattle, Wash. App. filed April 22, 1920. Superheating molten metal by passing through electrically heated furnace chamber.

1,455,748. ELECTRIC INDUCTION FURNACE; A. E. Greene, Seattle, Wash. App. filed Feb. 24, 1920.

1,455,767 and 1,455,768. WIRELESS RECEIVING SYSTEM; J. Slepian, Swissvale, Pa. App. filed Jan. 20, 1922. Responsive to signal from damped or undamped systems without heterodyning step.

(Issued May 22, 1923)

15,613 (reissue). SIGN FLASHER; J. H. Wheelock, Fitzwilliam, N. H. App. filed May 11, 1917. Contactors on motor shaft.

1,455,769. MACHINE SWITCHING TELEPHONE SYSTEM; R. C. Arter, Gallon, Ohio. App. filed June 7, 1920. Relates to telephone systems, and particularly to the selecting and switching circuits.

1,456,781. ELECTRICAL CONDENSER; W. Dubilier, New York, N. Y. App. filed Dec. 7, 1921. One microfarad condenser composed of twenty units.

1,456,795. MEANS FOR CONTROLLING A PRODUCTION PROCESS; L. Logan, Pittsburgh, Pa. App. filed Dec. 20, 1920. Control scheme involving light cell to actuate a relay.

1,456,811. METHOD OF UNITING METAL PLATES; J. C. Sander, Lynn, Mass. App. filed May 10, 1920. Welding a thick and thin plate.

1,455,817 and 1,455,818. TELEPHONE OR OTHER SOUND RECEIVER; L. Steinberger, Brooklyn, N. Y. App. filed Jan. 21, 1921. Equalization of air pressure on both sides of diaphragm.

1,455,827. SELECTIVE CIRCUIT FOR MULTIPLEX TRANSMISSION; H. A. Affel, Brooklyn, N. Y. App. filed Sept. 24, 1919. Several signals transmitted over grounded conductor such as submarine cable.

1,455,842. IMPLEMENT FOR WRITING; W. F. Kelly, Greenwood, Miss. App. filed March 23, 1922. Heated marking element.

1,455,843. SYSTEM FOR MEASURING DISTORTION; M. Kirkwood, East Orange, N. J. App. filed Feb. 7, 1920. For telephone systems.

1,455,845. MODULATED SIGNALING SYSTEM PARTICULARLY APPLICABLE TO WIRELESS SIGNALING; N. Lea, London, England. App. filed May 2, 1921. Amplifying apparatus.

1,455,895. ELECTROMECHANICAL BRAKE; E. B. Thurston, Toledo, Ohio. App. filed Nov. 12, 1923. For elevators.

1,455,896. WIRELESS TELEGRAPH RECEIVER; L. B. Turner, Cambridge, England. App. filed Feb. 9, 1921. Method of increasing speed of receiving telegraph signals.

1,455,903. RHEOSTAT; W. G. Clark, Oak Park, Ill. App filed May 9, 1921. For railway motors.

1,455,909. ELECTRIC COOKER AND HEATER; G. O. Ditton, Lanoka, N. J. App. filed Aug. 16, 1921.

1,455,938. SIGNAL LANTERN; F. J. Rode R. I. Frost and J. L. Liston, Augusta, Kan. App. filed April 21, 1921. Any one of several different colored lights may be projected.

1,455,951. SEMI-AUTOMATIC TELEPHONE SYSTEM; B. D. Willis, Chicago, Ill. App. filed May 31, 1919. Two-way trunk circuit between manual and automatic exchanges.

1,455,954. TELEPHONE SYSTEM; G. A. Yanochowski, Chicago, Ill. App. filed April 25, 1917. Link circuits having automatically ringing secret service.

1,455,957. REPEATER SYSTEM; E. D. Johnson, East Orange, N. J. App. filed Jan. 18, 1918. One-way repeater reversibly connected for two-way transmission of signals.

1,455,958. SIGNALING SYSTEM; E. D. Johnson, East Orange, N. J. App. filed Jan. 24, 1918. Automatic repeater for telephone lines.

1,455,998. CALLING DEVICE ATTACHMENT; F. W. Fahrenfeld, Chicago, Ill. App. filed May 1, 1920. Dial for automatic telephone system.

1,456,033. ELECTRIC STARTING AND GENERATING APPARATUS; W. B. Moses, Portland, Me. App. filed March 30, 1917. For automobiles.

1,456,059. SIGNALING SYSTEM; E. D. Johnson, East Orange, N. J. App. filed Jan. 18, 1918. Automatic repeater for telephone lines.

1,456,076. MEASURING AND TESTING OF INDUCTANCES; C. W. Robbins, La Grange, Ill. App. filed June 18, 1921. Apparatus for measuring telephone loading coils.

1,456,081. ELECTRIC REGULATOR; W. A. Turbayne, Niagara Falls, N. Y. App. filed July 17, 1919. Dead-beat and sensitive to small changes.

1,456,082. MOTOR DRIVE; H. E. Warren, Ashland, Mass. App. filed Sept. 1, 1920. For synchronous motor-driven secondary clocks.

1,456,084. SUPPORT FOR OVERHEAD WIRES OF ELECTRIC RAILWAYS; H. Westphal, Berlin, Germany. App. filed Oct. 7, 1922. Clamping car.

1,456,091. ELECTRICAL APPARATUS FOR ILLUMINATING AND DECORATING CHRISTMAS TREES AND SIMILAR USES; J. H. Betts, Brightwater, N. Y. App. filed Feb. 12, 1919.

1,456,092. DYNAMO-ELECTRIC MACHINE; J. L. Burnham, Schenectady, N. Y. App. filed Oct. 30, 1920. Provided with anti-sparking windings.

1,456,100. TIME-ELEMENT CIRCUIT CONTROLLER; J. Eaton, Schenectady, N. Y. App. filed Jan. 15, 1920. If voltage falls, device holds motor switch in until motor speed drops to predetermined value.

1,456,104. DEMAND METER; C. I. Hall, Fort Wayne, Ind. App. filed Oct. 6, 1919. Mechanical means for resetting pointer.

1,456,107. ELECTRIC RESISTANCE FURNACE; C. L. Ipsen, Schnectady, N. Y. App. filed May 28, 1921. Support for ribbon elements.

1,456,108. COIL AND SPOOL CONSTRUCTION; S. E. Johannssen, Pittsfield, Mass. App. filed Feb. 6, 1920. Method of forming coil on spool.

1,456,110. SEAL FOR ELECTRIC DEVICES; G. M. J. Mackay, Schenectady, N. Y. App. filed Jan. 21, 1921. Lead-in terminal for airtight apparatus.

1,456,120. MAGNET FRAME; J. Burke, Erie, Pa. App. filed Nov. 6, 1919. Frame to hold field coils for electrical machinery.

1,456,141. ELECTRIC HEATER; C. H. W. Morrison, London, England. App. filed July 10, 1922. For heating small quantities of liquid or semi-liquid substances.

1,456,148 and 1,456,149. RECORDING APPARATUS FOR VALVES AND THE LIKE; C. E. Renshaw, East Orange, N. J. App. filed July 29, 1919. Apparatus to show whether valve is opened or closed.

1,456,172. TELEPHONE SYSTEM; G. A. Yanochowski, Chicago, Ill. App. filed Jan. 16, 1919. Apparatus and circuits for connecting links.

1,456,194. COMBINATION FLOOR LAMP, TABLE LAMP AND PEDESTAL; J. Rosenberg, Chicago, Ill. App. filed Jan. 9, 1922.

1,456,223. ELECTRICAL BLANKET AND THE LIKE; W. F. Craddock and C. M. Uhlig, Chicago, Ill. App. filed April 7, 1922. Element woven into blanket.

1,456,267; VARIOMETER; H. P. Donle, Meriden, Conn. App. filed Feb. 17, 1922. Two coils on same axis rotatable in regard to each other.

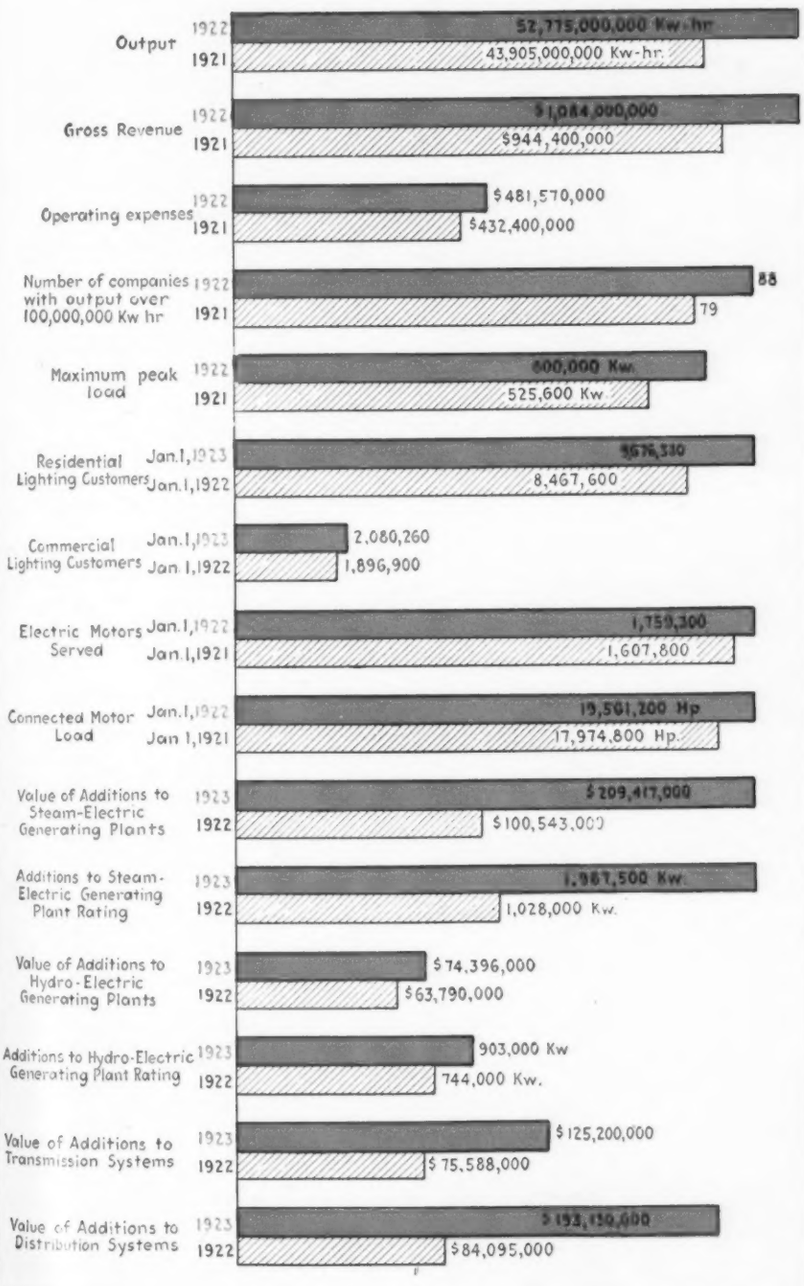
1,456,282. ALTERNATING-CURRENT ELECTRIC BELL; C. J. Rohland, Seekonk, Mass. App. filed April 12, 1916.

1,456,285. THERMOSTATIC LAMP-DIMMING PULL SOCKET; R. D. Smith, Milton, Mass. App. filed Nov. 3, 1920.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

High Lights in the Central Station Industry



Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote or use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those using these statistics would credit the ELECTRICAL WORLD.

The Vision of the Future

"We will not anticipate the past. Our retrospection will be all to the future."

THE electric light and power industry is essentially an industry with all the future anticipations of youth—of a young athlete fresh from a long period of intensive training and brilliant accomplishments, fully ready and anxious to conquer the problems of the future with every expectation of a successful issue.

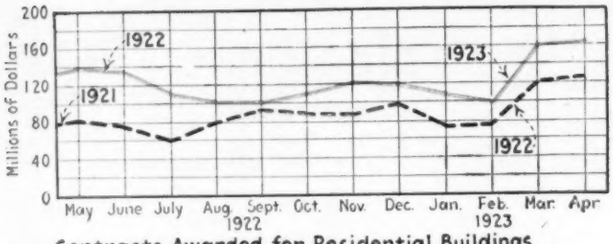
The group of America's servants which met in convention during the past week represented every phase of the industry and every section of the country. They are proud of their past—of the way they have kept faith with the public, of their accomplishments in overcoming inefficient generation, transmission and distribution of electrical energy, of the enviable place which the industry has assumed in the financial world, and of the general growth in operations during the first forty years of the industry's life. They feel themselves standing upon a foundation which is as solid as the very nation itself.

But while these men and the great industry they represent feel a legitimate pride in that which has been accomplished, it is on the future that all eyes are focused. What of it? What are the problems which will have to be met and solved if the industry is to continue triumphant on its way? Will the present rate of growth continue, and, if so, how long?

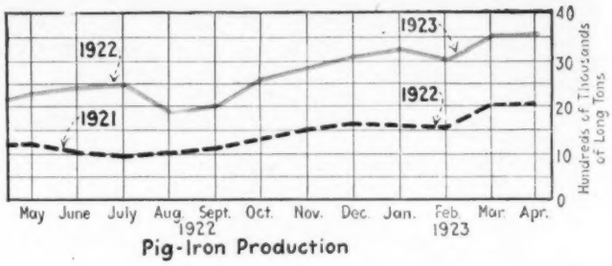
The answers to these questions are shrouded in the uncertainty of human events and the adaptation of electrical energy to new fields of usefulness. But much may be judged by a retrospective glance at the industry's growth. The theory of probabilities can be brought into play and the future to a certain degree can be foretold. Such prophecies, if not extended too far into the future, are permissible. Indeed, they are necessary if effort is to be crowned with success.

The industry should without doubt live in the future, but the past should ever serve as a guide to the unseen problems which are sure to be encountered as history unrolls.

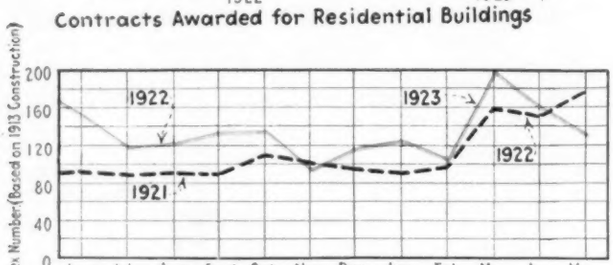
How the Primary Industries Are Trending



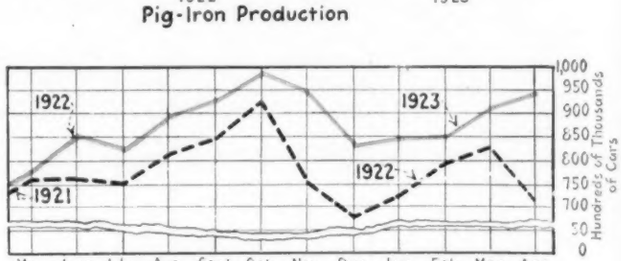
Contracts Awarded for Residential Buildings



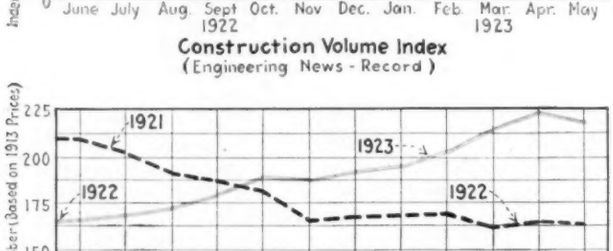
Pig-Iron Production



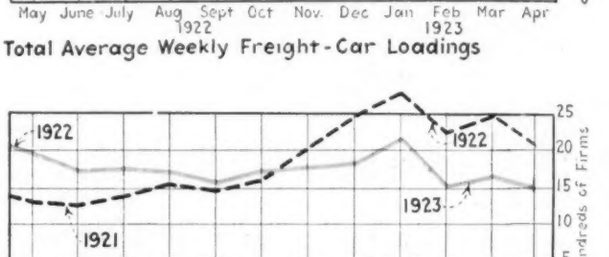
Construction Volume Index
(Engineering News-Record)



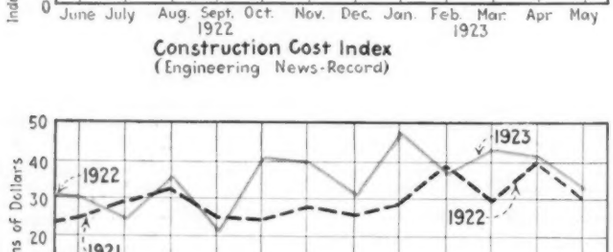
Total Average Weekly Freight-Car Loadings



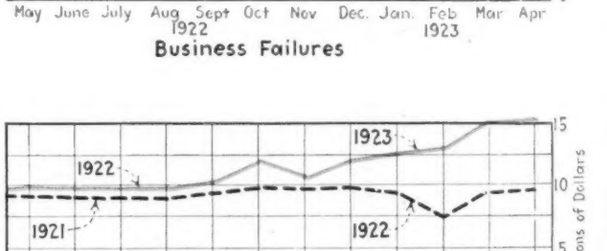
Construction Cost Index
(Engineering News-Record)



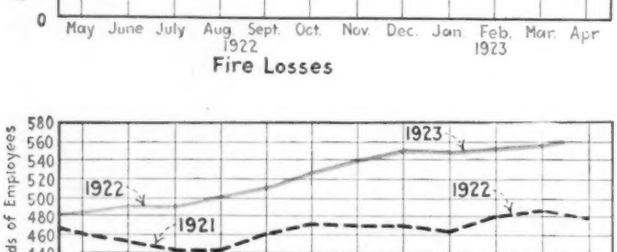
Business Failures



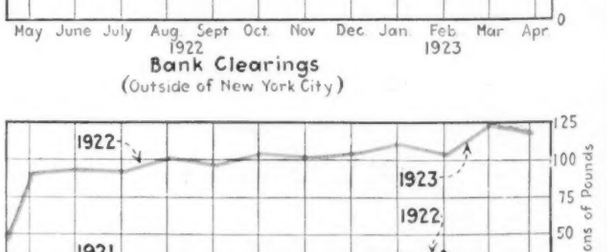
Fire Losses



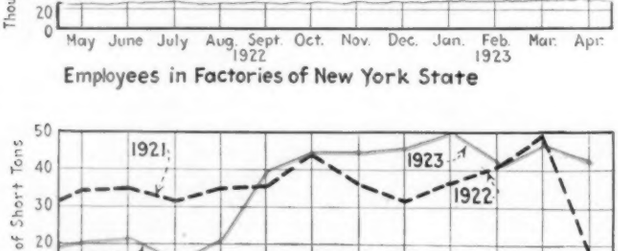
Bank Clearings
(Outside of New York City)



Employees in Factories of New York State



Copper Production



Bituminous Coal Production

Volume of Construction on the Decrease

High cost of materials and increased wage demands of labor are very definitely reflected in the slump in the volume of new construction reported during March and April. Reports are that this slump will be even more emphasized during May. Decreased cost of materials during April was the natural result of a decreased volume of construction. In other words, the holding back of new construction seems to be obtaining the desired results—decreased construction cost.